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C. HART MERRIAM, *Chief.*

DISTRIBUTION AND MIGRATION

OF

NORTH AMERICAN WARBLERS.

BY

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LETTER OF TRANSMITTAL.

U. S. Department of Agriculture,
Biological Survey,
Washington, D. C., August 1, 1904.

Sir: I have the honor to transmit herewith for publication as Bulletin No. 18 of the Biological Survey a report on the Distribution and Migration of North American Warblers, by Wells W. Cooke, n assistant in the Survey.

Respectfully,

C. Hart Merriam,
Chief, Biological Survey.

Hon. James Wilson,
Secretary of Agriculture.

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DISTRIBUTION AND MIGRATION OF NORTH AMERICAN WARBLERS.

INTRODUCTION.

The warblers are birds of wide distribution. They occur in summer in greater or less abundance over nearly the whole of North America except the arid lands of the Southwest and the Barren Grounds of the far North. Though of small size they are brightly colored, and during the migrations they come in such numbers, both of species and individuals, that they often form the most conspicuous part of a bird wave, and their return is awaited with eagerness by students of migration. In spring the lover of the beautiful finds among them brilliant colors in multiple variety; the practiced ear is taxed to distinguish their faint songs dropping from the tree tops; and the experienced ornithologist feels a pleasurable excitement in scanning each individual of the passing host as he seeks the rarity that will more than repay the time spent in the search. In the fall, when the same bands in less conspicuous garb return with the season's offspring, even the skilled observer finds himself perplexed to identify every species as it passes—singly, by twos and threes, in restless flocks, or in the swarming numbers of the bird wave.

The family of warblers is a large one, its members in the United States numbering over seventy species and subspecies. These, in the distances they travel in migration and in the size of the areas they occupy during the breeding season, present an enormous range of variation. Some, as the yellow warbler (*Dendroica æstiva*) and the yellow-breasted chat (*Icteria virens*), breed over the greater part of the United States, excepting the arid areas, and make long flights in migration; while others, as the Belding yellowthroat (*Geothlypis beldingi*), are restricted to areas only a few square miles in extent, where they remain the year around. Among the birds that perform regular migrations are some that go only a few miles, as the Florida yellowthroats (*Geothlypis trichas ignota*), that cross back and forth between Cuba and the Gulf States, and others that travel many thousands of miles, as the black-poll warblers (*Dendroica striata*) that nest in Alaska and northern Canada and spend the winter in South America, from Brazil to Chile. From the foregoing it is obvious that the size of the area occupied in winter varies enormously—thus, at this season the Swainson warbler (*Helinaia swainsoni*) is restricted to the island of Jamaica, while the yellow warbler (*Dendroica æstiva* and its subspecies) is distributed from western Mexico to French Guiana.

ROUTES OF MIGRATION.

In passing between the United States and their winter homes, warblers use all the routes followed by other species of birds. The belief of the writer is that when birds begin to migrate in the fall, their path of migration is the full width of the breeding range, but that owing to the conformation of the North American continent, the lines of flight taken by individual birds necessarily converge so that as a species proceeds southward, the width of the region occupied by it becomes less. The kingbird (*Tyrannus tyrannus*) affords a more striking example of this than can be found among the warblers. Its summer home—from Newfoundland to British Columbia—has a width of 2,800 miles; its paths of migration converge until in the southern United States from southern Florida to the mouth of the Rio Grande their total width is 900 miles. Continuing southward, the eastern edge of this path or belt appears to extend from southern Florida to Yucatan, but the western edge is less sharply defined; few individuals of the species seem to travel west of a line drawn from Corpus Christi to Tabasco. Thus in the latitude of southern Yucatan the migration path is scarcely 400 miles wide, and the great bulk of the species probably move in a belt less than half this width.

When the warblers pass beyond the southern boundary of the United States, the width and destination of their paths of migration vary greatly among the different species. Some go to the Bahamas and not to Cuba, others to Cuba and not to Yucatan, or to Yucatan and not to Cuba. In the case of wide-ranging species, like the black and white warbler or the redstart, it is probable that some individuals cross from northern Florida to the northern Bahamas, others from central Florida to the central or southern Bahamas, others from southern Florida to Cuba, others from northwestern Florida to Yucatan, and still others from points to the west of these localities. These different lines of flight between the southern boundary of the United States and the countries to the south are called in this publication migration routes, but they are not to be considered definite paths with exact boundaries, but merely minor subdivisions of a great migration route that pass insensibly into each other. The principal subdivisions, or routes, are the following:

1. United States to the Bahamas.
2. Florida to Cuba.
3. Western Florida to Yucatan.
4. Northern coast of the Gulf of Mexico southward.
5. Texas to Mexico by land.
6. Western United States to Mexico.

In the lists that follow the species known to use each of the principal migration routes are mentioned. The mention of a species, however, must not be understood as meaning all the individuals of that species, but only a greater or smaller number. In each case it is probable that species other than those enumerated make use of the same route, but records are lacking.

UNITED STATES TO THE BAHAMAS.

Some individuals of the following species migrate from the United States to the Bahamas, and find their farthest extension either in the West Indies (at the points mentioned below), on the island of Trinidad, or on the mainland of South America:

Black and white warbler (*Mniotilta varia*). Guadeloupe (Leeward Islands).
Worm-eating warbler (*Helmitheros vermivorus*). Great Inagua (Bahamas).
Parula warbler (*Compsothlypis americana*). Barbados (Windward Islands).
Cape May warbler (*Dendroica tigrina*). Tobago.
Black-throated blue warbler (*Dendroica cærulescens*). Haiti.
Myrtle warbler (*Dendroica coronata*). Porto Rico.
Black-poll warbler (*Dendroica striata*). Trinidad.
Yellow-throated warbler (*Dendroica dominica*). Porto Rico.
Kirtland warbler (*Dendroica kirtlandi*). Caicos (Bahamas).
Palm warbler (*Dendroica palmarum*). Porto Rico.
Prairie warbler (*Dendroica discolor*). St. Christopher (Leeward Islands).
Oven-bird (*Seiurus aurocapillus*). St. Croix (Leeward Islands).
Water-thrush (*Seiurus noveboracensis*). Trinidad.
Louisiana water-thrush (*Seiurus motacilla*). Antigua (Leeward Islands).
Connecticut warbler (*Geothlypis agilis*). Bahamas; Brazil; Colombia.
Maryland yellow-throat (*Geothlypis trichas*). North Bahamas.
Northern yellow-throat (*Geothlypis trichas brachidactyla*). Bahamas.
Redstart (*Setophaga ruticilla*). Trinidad.

Land birds do not use the line of the West Indies from the Bahamas eastward as their common route of migration between the United States and South America. Some 37 species of these, including 18 warblers, cross from Florida to the Bahamas, and about 18 of them, 12 being warblers, continue east to Porto Rico, while only 6 are known to pass to the Windward Islands, Trinidad, and South America. On the other hand, about 50 species of land birds migrate from the eastern United States to South America without being known to enter the Lesser Antilles.

FLORIDA TO CUBA.

The best known route is between Florida and Cuba. It is regularly used by individuals of the following species:

Black and white warbler (*Mniotilta varia*).
Swainson warbler (*Helinaia swainsoni*). To Jamaica
Worm-eating warbler (*Helmitheros vermivorus*).
Bachman warbler (*Helminthophila bachmani*).
Parula warbler (*Compsothlypis americana*).
Cape May warbler (*Dendroica tigrina*).

Black-throated blue warbler (*Dendroica cærulescens*).
Myrtle warbler (*Dendroica coronata*).
Black-poll warbler (*Dendroica striata*).
Yellow-throated warbler (*Dendroica dominica*).
Palm warbler (*Dendroica palmarum*).
Prairie warbler (*Dendroica discolor*).
Oven-bird (*Seiurus aurocapillus*).
Water-thrush (*Seiurus noveboracensis*).
Louisiana water-thrush (*Seiurus motacilla*).
Florida yellow-throat (*Geothlypis trichas ignota*).
Northern yellow-throat (*Geothlypis trichas brachidactyla*).
Redstart (*Setophaga ruticilla*).

WESTERN FLORIDA TO YUCATAN.

The next migration route to the westward is from western Florida to Yucatan directly, without touching southern Florida or Cuba. This route is used by individuals of the—

Yellow warbler (*Dendroica æstiva*).
Magnolia warbler (*Dendroica maculosa*).
Black-throated green warbler (*Dendroica virens*).
Hooded warbler (*Wilsonia mitrata*).

It is also probably used to a greater or less extent by many other species, but this can not at present be proved.

NORTHERN COAST OF THE GULF OF MEXICO SOUTHWARD.

Many species leave the United States along the coast from western Florida to the region about Galveston, Tex., and fly across the Gulf of Mexico.

This route is used by individuals of the following species:

Black and white warbler (*Mniotilta varia*).
Prothonotary warbler (*Protonotaria citrea*).
Worm-eating warbler (*Helmitheros vermivorus*).
Golden-winged warbler (*Helminthophila chrysoptera*).
Parula warbler (*Compsothlypis americana*).
Yellow warbler (*Dendroica æstiva*).
Magnolia warbler (*Dendroica maculosa*).
Cerulean warbler (*Dendroica cerulea*).
Chestnut-sided warbler (*Dendroica pensylvanica*).
Bay-breasted warbler (*Dendroica castanea*).
Blackburnian warbler (*Dendroica blackburniæ*).
Black-throated green warbler (*Dendroica virens*).
Oven-bird (*Seiurus aurocapillus*).
Water-thrush (*Seiurus noveboracensis*).
Kentucky warbler (*Geothlypis formosa*).
Mourning warbler (*Geothlypis philadelphia*).
Yellow-breasted chat (*Icteria virens*).
Hooded warbler (*Wilsonia mitrata*).
Canadian warbler (*Wilsonia canadensis*).
Redstart (*Setophaga ruticilla*).

TEXAS TO MEXICO BY LAND.

Some individuals of the following species enter eastern Mexico by land from Texas. With one exception they represent species whose winter home is more commonly reached by a flight across the Gulf of Mexico. The exception is the orange crowned warbler (*Helminthophila celata*) which seems to avoid a water trip and to go entirely by land to Mexico.

Black and white warbler (*Mniotilta varia*).
Blue-winged warbler (*Helminthophila pinus*).
Nashville warbler (*Helminthophila rubricapilla*).
Orange-crowned warbler (*Helminthophila celata*).
Tennessee warbler (*Helminthophila peregrina*).
Parula warbler (*Compsothlypis americana*).
Yellow warbler (*Dendroica æstiva*).
Myrtle warbler (*Dendroica coronata*).
Magnolia warbler (*Dendroica maculosa*).
Chestnut-sided warbler (*Dendroica pensylvanica*).
Blackburnian warbler (*Dendroica blackburniæ*).
Sycamore warbler (*Dendroica dominica albilora*).
Black-throated green warbler (*Dendroica virens*).
Oven-bird (*Seiurus aurocapillus*).
Water-thrush (*Seiurus noveboracensis*).
Louisiana water-thrush (*Seiurus motacilla*).
Northern yellow-throat (*Geothlypis trichas brachidactyla*).
Western yellow-throat (*Geothlypis trichas occidentalis*).
Yellow-breasted chat (*Icteria virens*).
Hooded warbler (*Wilsonia mitrata*).
Wilson warbler (*Wilsonia pusilla*).
Canadian warbler (*Wilsonia canadensis*).
Redstart (*Setophaga ruticilla*).

Of the species just given, a few show a tendency to migrate farther west than the others. In general it may be said that the winter range is seldom west of the breeding range. The principal direction of migration is of course south, and those individuals that have a choice of moving to the east or to the west of south almost always proceed eastward. An exception to this rule is found in the case of the following species, which extend in western Mexico to the localities mentioned:

Black and white warbler (*Mniotilta varia*). Mazatlan.
Sycamore warbler (*Dendroica dominica albilora*). Tepic.
Oven-bird (*Seiurus aurocapillus*). Mazatlan.
Louisiana water-thrush (*Seiurus motacilla*). Mazatlan.

It is noteworthy in this connection that two of these, the black and white warbler and the oven-bird, have been taken as rare visitors to the Rocky Mountains; and it is possible that it is these western stragglers that winter in western Mexico.

WESTERN MIGRATION ROUTE TO MEXICO.

The westernmost part of the great migration route between the United States and the countries to the south is used by the following species that migrate by land to Mexico:

Lucy warbler (*Helminthophila luciæ*).
Virginia warbler (*Helminthophila virginiæ*).
Calaveras warbler (*Helminthophila rubricapilla gutturalis*).
Lutescent warbler (*Helminthophila celata lutescens*).
Sennett warbler (*Compsothlypis pitiayumi nigrilora*).
Olive warbler (*Dendroica olivacea*).
Sonora yellow warbler (*Dendroica æstiva sonorana*).
Alaska yellow warbler (*Dendroica æstiva rubiginosa*).
Audubon warbler (*Dendroica auduboni*).
Black-fronted warbler (*Dendroica auduboni nigrifrons*).
Grace warbler (*Dendroica graciæ*).
Black-throated gray warbler (*Dendroica nigrescens*).
Golden-cheeked warbler (*Dendroica chrysoparia*).
Pacific yellow-throat (*Geothlypis trichas arizela*).
Townsend warbler (*Dendroica townsendi*).
Hermit warbler (*Dendroica occidentalis*).
Grinnell water-thrush (*Seiurus noveboracensis notabilis*).
Macgillivray warbler (*Geothlypis tolmiei*).
Western yellow-throat (*Geothlypis trichas occidentalis*).
Rio Grande yellow-throat (*Geothlypis poliocephala*).
Long-tailed chat (*Icteria virens longicauda*).
Pileolated warbler (*Wilsonia pusilla pileolata*).
Golden pileolated warbler (*Wilsonia pusilla chryseola*).
Painted redstart (*Setophaga picta*).
Red-faced warbler (*Cardellina rubrifrons*).

The lines of migration so far given cover the principal routes by which the birds of the United States reach their winter quarters. There is another route which can not be mapped owing to lack of data. Indeed, its existence is largely inferential. Several species that occur in the Mississippi Valley and the Allegheny Mountains reach Middle America in winter, but are not known regularly in migration in Florida, Cuba, Yucatan, or northeastern Mexico. It is thus certain that these species pass from the Mississippi Valley and the Allegheny Mountains to Middle America, but the point of departure from the United States and the point of arrival in Middle America are not yet known. It seems probable that the birds cross directly to the heavy, damp forests that cover the lowlands of eastern Honduras, the southern parts of Yucatan and Campeche, and the highlands of northwestern Guatemala, but not until this region, as yet unvisited during the fall migration, has been thoroughly explored, can any exact knowledge on the point be obtained. Species that appear largely to use this route are the following:

Blue-winged warbler (*Helminthophila pinus*).
Nashville warbler (*Helminthophila rubricapilla*).
Tennessee warbler (*Helminthophila peregrina*).
Wilson warbler (*Wilsonia pusilla*).

It is probable also that this route is used by many individuals of the following species:

Cerulean warbler (*Dendroica cerulea*).
Chestnut-sided warbler (*Dendroica pensylvanica*).
Blackburnian warbler (*Dendroica blackburniæ*).
Mourning warbler (*Geothlypis philadelphia*).

It seems probable that not all birds in their migrations north across the Gulf of Mexico alight as soon as they reach the coast of the United States. How far they penetrate into the interior before they descend is not known, but the latitude reached probably approximates the northern edge of the Gulf strip of the Austroriparian life zone—that is, slightly north of the latitude of the northern boundary of Florida. More or less strong reasons exist for believing that some individuals of each of the following species sometimes fly inland before alighting:

Black and white warbler (*Mniotilta varia*).
Nashville warbler (*Helminthophila rubricapilla*).
Yellow warbler (*Dendroica æstiva*).
Magnolia warbler (*Dendroica maculosa*).
Cerulean warbler (*Dendroica cerulea*).
Chestnut-sided warbler *Dendroica pensylvanica*).
Bay-breasted warbler (*Dendroica castanea*).
Blackburnian warbler (*Dendroica blackburniæ*).
Mourning warbler (*Geothlypis philadelphia*).
Yellow-breasted chat (*Icteria virens*).
Wilson warbler (*Wilsonia pusilla*).
Redstart (*Setophaga ruticilla*).

OCCASIONAL ROUTES TO OR THROUGH CUBA OR YUCATAN.

Mention should be made of two other possible routes that have not yet been noticed—one from Cuba to Yucatan, the other from Cuba to South America. It is undoubtedly true that certain day-migrants (the swallows, for instance) cross between Cuba and Yucatan, but of the night-migrants, such as the warblers, there seems at present no proof that any use this as a regular path of migration. The fact that a comparatively small number of species of warblers are found as regular visitors to both Cuba and Yucatan would create a presumption against this route being much used, while some of the warblers certainly do not follow it. The three following lists make these points clearer.

SPECIES THAT OCCUR REGULARLY IN BOTH CUBA AND YUCATAN.

Black and white warbler (*Mniotilta varia*).
Parula warbler (*Compsothlypis americana*).

Myrtle warbler (*Dendroica coronata*).
Oven-bird (*Seiurus aurocapillus*).
Water-thrush (*Seiurus noveboracensis*).
Louisiana water-thrush (*Seiurus motacilla*).
Northern yellow-throat (*Geothlypis trichas brachidactyla*).
Redstart (*Setophaga ruticilla*).

SPECIES THAT OCCUR REGULARLY IN CUBA BUT NOT IN YUCATAN.

Bachman warbler (*Helminthophila bachmani*).
Black-throated blue warbler (*Dendroica cærulescens*). Yucatan once.
Black-poll warbler (*Dendroica striata*).
Yellow-throated warbler (*Dendroica dominica*).

SPECIES THAT OCCUR REGULARLY IN YUCATAN BUT NOT IN CUBA.

Prothonotary warbler (*Protonotaria citrea*).
Yellow warbler (*Dendroica æstiva*).
Magnolia warbler (*Dendroica maculosa*).
Blackburnian warbler (*Dendroica blackburniæ*).
Sycamore warbler (*Dendroica dominica albilora*).
Black-throated green warbler (*Dendroica virens*).
Hooded warbler (*Wilsonia mitrata*).

Not enough data have been accumulated to permit any exact statement as to the species of warblers, if any, that cross from Cuba to South America. It is known that some other birds, as the bobolink (*Dolichonyx oryzivorus*) and Florida kingbird (*Tyrannus dominicensis*), pass over this route in large numbers. That warblers seldom cross the Caribbean Sea is probable from the fact that of nearly a score of species that occur in the eastern United States and also in South America, only the following 6 occur regularly in Cuba.

SPECIES THAT OCCUR IN BOTH CUBA AND SOUTH AMERICA.

Black and white warbler (*Mniotilta varia*).
Black-poll warbler (*Dendroica striata*).
Oven-bird (*Seiurus aurocapillus*).
Water-thrush (*Seiurus noveboracensis*).
Louisiana water-thrush (*Seiurus motacilla*).
Redstart (*Setophaga ruticilla*).

SOUTHERNMOST EXTENSION OF WINTER RANGES OF WARBLERS OF EASTERN NORTH AMERICA.

The following tables show the southernmost limits at which the various species of eastern warblers have been recorded in winter.

SPECIES THAT RANGE TO THE MAINLAND OF SOUTH AMERICA.

Black and white warbler (*Mniotilta varia.*)	Colombia, Venezuela, Ecuador.
Prothonotary warbler (*Protonotaria citrea*).	Colombia, Venezuela.
Blue-winged warbler (*Helminthophila pinus*).	Colombia—one accidental occurrence.
Golden-winged warbler (*Helminthophila chrysoptera*).	Colombia.

Tennessee warbler (*Helminthophila peregrina*). Colombia, Venezuela.

Yellow warbler (*Dendroica æstiva*). Colombia, Venezuela, British, Dutch, and French Guiana, Brazil, Ecuador, Peru.

Black-throated blue warbler (*Dendroica cærulescens*). Colombia; one accidental occurrence.

Cerulean warbler (*Dendroica cerulea*). Colombia, Ecuador, Peru, Bolivia.

Bay-breasted warbler (*Dendroica castanea*). Colombia.

Black-poll warbler (*Dendroica striata*). Colombia, Venezuela, British Guiana, French Guiana, Brazil, Peru, Chile, Ecuador.

Blackburnian warbler (*Dendroica blackburniæ*). Colombia, Venezuela, Ecuador, Peru.

Oven-bird (*Seiurus aurocapillus*). Colombia—rare.

Water-thrush (*Seiurus noveboracensis*). British Guiana, Venezuela, Colombia.

Grinnell water-thrush (*Seiurus noveboracensis notabilis*). Colombia.

Louisiana water-thrush (*Seiurus motacilla*). Colombia—rare.

Kentucky warbler (*Geothlypis formosa*). Colombia.

Connecticut warbler (*Geothlypis agilis*). Colombia, Brazil.

Mourning warbler (*Geothlypis philadelphia*). Colombia, Ecuador.

Canadian warbler (*Wilsonia canadensis*). Colombia, Ecuador, Peru.

Redstart (*Setophaga ruticilla*). Colombia, Venezuela, Ecuador, British Guiana.

SPECIES KNOWN TO RANGE TO BUT NOT BEYOND PANAMA.

Worm-eating warbler (*Helmitheros vermivorus*).

Myrtle warbler (*Dendroica coronata*).

Magnolia warbler (*Dendroica maculosa*).

Chestnut-sided warbler (*Dendroica pensylvanica*).

Black-throated green warbler (*Dendroica virens*).

Northern yellow-throat (*Geothlypis trichas brachidactyla*).

Hooded warbler (*Wilsonia mitrata*).

SPECIES THAT ENTER MEXICO AND CENTRAL AMERICA BUT ARE NOT KNOWN TO REACH PANAMA.

Blue-winged warbler (*Helminthophila pinus*). Nicaragua; one accidental occurrence in Colombia.

Nashville warbler (*Helminthophila rubricapilla*). Mexico. Guatemala—straggler.

Orange-crowned warbler (*Helminthophila celata*). Mexico.

Parula warbler (*Compsothlypis americana*). Nicaragua.

Black-throated blue warbler (*Dendroica cærulescens*). Guatemala—one accidental occurrence.

Sycamore warbler (*Dendroica dominica albilora*). Costa Rica.

Palm warbler (*Dendroica palmarum*). Yucatan.

Yellow-breasted chat (*Icteria virens*). Costa Rica.

Wilson warbler (*Wilsonia pusilla*). Costa Rica.

SPECIES THAT DO NOT REGULARLY WINTER ON THE MAINLAND SOUTH OF THE UNITED STATES, BUT REMAIN IN THE SOUTHERN STATES OR THE WEST INDIES.

Swainson warbler (*Helinaia swainsoni*). Jamaica. Accidental in Mexico—one record.

Bachman warbler (*Helminthophila bachmani*). Cuba.

Cape May warbler (*Dendroica tigrina*). West Indies. Key West—rare or accidental. Accidental in Yucatan—one record.

Black-throated blue warbler (*Dendroica cærulescens*). West Indies. Key West—sometimes not uncommon. Accidental in Guatemala and Colombia.

Yellow-throated warbler (*Dendroica dominica*). West Indies. Florida and locally along coast to South Carolina. Accidental in Yucatan—one record.

Kirtland warbler (*Dendroica kirtlandi*). Bahamas.

Pine warbler (*Dendroica vigorsii*).[a] United States north to Virginia, Illinois, etc. Accidental in Mexico; one record.

Yellow palm warbler (*Dendroica palmarum hypochrysea*). United States. Accidental in Cuba and Jamaica.

Prairie warbler (*Dendroica discolor*). West Indies and other islands.

Maryland yellow-throat (*Geothlypis trichas*). United States and Bahamas.

Florida yellow-throat (*Geothlypis trichas ignota*). United States and Cuba.

SYSTEMATIC REPORT.

The present paper is devoted to a systematic account of the distribution and migration of the North American warblers, numbering 59 species and 19 subspecies. In each case the breeding range is given first, then the winter range, followed by a synopsis of the time of spring migration and of fall migration. Bibliographical references relating to the occurrence of the various species in South America are given in full. For the purposes of this article 'North America' includes the mainland north of Mexico and also the peninsula of Lower California, as in the Check-List of the American Ornithologists' Union; and 'West Indies' includes all the islands commonly known under that name, except Tobago and Trinidad, near the coast of South America. The name of each species is preceded by its number in the above-mentioned Check-List. Most interest attaches to the movements of the warblers of the eastern part of the United States that pass by flight over water to their winter homes. These, therefore, receive full treatment, while less is said of the migration of the western species that make the journey from the United States to Mexico and southward entirely by land. Special attention has been paid to the definition of the southern limit of the breeding range of each species—a subject that for many years has received the careful consideration of the Biological Survey. So far as known to the writer, the present paper is the first attempt to define exactly the northern limit of the winter range of each species, and also to indicate the altitudinal range of the same in its winter home.

The report is based largely on records received by the Biological Survey from land stations and lighthouses, together with records from countries south of the United States, especially Costa Rica,

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[a] The pine warbler of the Bahamas has lately been separated as subspecies *achrustera;* the regular winter habitat of *vigorsii* is therefore entirely within the United States, this being the only case of an eastern warbler confined to this country during the winter.

Nicaragua, and Mexico. The systematic migration records of Mr. George K. Cherrie, for two years at San José, Costa Rica, and of Dr. C. W. Richmond, for a year in southeastern Nicaragua, have been of great service and value. The field parties of the Biological Survey which have worked for twelve years in Mexico have obtained a large amount of excellent data of extreme usefulness in determining questions of winter distribution and migration. But while much has been done, some notable deficiencies exist. No observer has been along the coast of northwestern Florida during the fall migration and records of spring migration in this locality are deplorably lacking. While Yucatan has been well studied in winter and spring, almost no notes have been made on the north coast or on the islands off the east coast during the period from July until late in the fall. Consequently the beginning of fall migration in this country is unreported. Scarcely any birds have been collected in Guatemala southeast of the towns of Duenas and Retalhuleu, or during the migration season in any of the highlands of Honduras and Nicaragua. Hence little or nothing is known of the movements of birds through these countries, except by inference from data collected in Costa Rica and Mexico. In the greater part of Guatemala practically no field work has been done in the last twenty-five years.

In 1888 this office published a bulletin entitled Bird Migration in the Mississippi Valley,[a] by W. W. Cooke, containing the results of an effort to trace and time the birds during the spring and fall migrations of 1884 and 1885 from the Gulf of Mexico to Manitoba. In the northern half of this area the number of observers was sufficient to afford a fairly approximate knowledge of the movements of species. But south of St. Louis there were few records, and scarcely any of the arrival of birds on the north coast of the Gulf of Mexico. During the period that has elapsed since the bulletin was written, the Biological Survey has collected from all parts of North America a vast store of material on bird migration, and has been especially fortunate in the completeness of some of the records secured from the South. The largest single addition to the knowledge of movements of birds along the southern border of the United States is due to records of species striking the lighthouses off the south coast of Florida. Several thousands of these instances have been recorded. They furnish the best available data so far collected on the length of the migrating season, and afford also much-needed information concerning the time when many species of birds begin their migration in the fall. The keeper of the lighthouse at Sombrero Key, in particular, has taken much interest in the matter, and has spent many hours counting and identifying birds, either killed by flying against the glass protecting the light or resting bewildered on the balcony after striking. Eight hundred and sixteen records were received in five years from this one lighthouse. They comprise a total of 2,011 dead birds and 10,086 birds which struck the light with so little force that on the return of clear skies or daylight they were able to resume their flight. Warblers migrate chiefly by night and are so susceptible to the influence of a bright light that they constitute at least 80 percent of these thousands.

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[a] Bull. No. 2, Division of Economic Ornithology and Mammalogy, 1888.

The most valuable part of the present report is based on the migration schedules contributed to the Biological Survey during the past twenty years by voluntary observers throughout the Union. To each and all of these sincere thanks are hereby tendered.

636. **Mniotilta varia** (Linn.). Black and White Warbler.

Breeding range.—The southern limit of the principal breeding range of the black and white warbler is the southern boundary of the Carolinian life zone from North Carolina to Kansas. Records of the supposed breeding of the species in the Austroriparian zone in Texas, Louisiana, and northern Florida are quite numerous. Most of them, however, are based on records of young birds appearing so early in the summer that they were believed to have been reared in the immediate vicinity. The black and white warbler is, however, one of the very earliest of migrants. At the southern limit of its range it nests in April, giving the young abundant time to be strong-winged by early in July. It certainly does not breed in southern Florida, yet both adults and young of the year have been noted at Key West, Fla., by the middle of July, so that July dates in the Gulf States are not evidence of breeding. The breeding range extends north to New Brunswick, Nova Scotia, Newfoundland, Hudson Bay, and Fort Norman, Mackenzie; west regularly to central South Dakota, central Kansas, and central Texas, and casually to Lesser Slave Lake and Peace River Landing, Athabasca, Colorado (two breeding records), and California (three breeding records).

Winter range.—The black and white warbler has a limited range in South America, but is common in the Santa Marta region of northeastern Colombia—on the coast at Bonda,[a] and Santa Marta,[b] and in the mountains at Minca (2,000 feet),[c] Onaca (2,500 feet),[a] and Las Nubes (5,000 feet).[a] On the coast it is noted in the fall; in the mountains it occurs from December to March. Farther south it is recorded from Bucaramanga (3,000 feet),[d] from near there at Herradura (4,000 feet),[e] and from Bogota.[f] In the State of Antioquia it was taken at Concordia

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[a] Allen, Bull. Am. Mus. Nat. Hist., XIII, p. 178, 1900; Auk, XVII, 367, 1900.

[b] Bangs, Proc. Biol. Soc. Wash., XII, 143, 1898.

[c] Salvin and Godman, Ibis, p. 117, 1880.

[d] Berlepsch, J. f. Orn., p. 282, 1884.

[e] Wyatt, Ibis, p. 322, 1871.

[f] Sclater, Cat. Am. Birds, p. 26, 1862; P. Z. S., p. 143, 1855; Sharpe, Cat. Birds Brit. Mus., X, p. 253, 1885.

(6,000 feet),[a] and Sta. Elena (6,000 feet). These records carry the known range throughout the northern half of Colombia. The bird has also been recorded in the winter at Merida, Venezuela (5,400 feet),[b] and at Quito, Ecuador.[c] It is common in Panama up to 4,000 feet,[d] and at altitudes ranging from 1,500 to 4,000 feet in Costa Rica. It undoubtedly occurs during the winter on the higher lands of Honduras and Nicaragua, but apparently is not recorded from either country, probably because during this season observers have been only on the coast or at altitudes of less than a thousand feet in the interior. It has been taken in fall migration on Ruatan Island, off the coast of Honduras.[e] From northern Yucatan it ranges to the Pacific coast of Guatemala. It is found in winter on the islands[f] and mainland[g] of Yucatan and up to at least 7,000 feet in the mountains of Guatemala. In Mexico the distribution of the bird is extensive and peculiar. It is one of the few species from the eastern part of the United States that winter on the coast of western Mexico as far north as Colima and Mazatlan. The parties of the Biological Survey met it in nearly every part of Mexico visited, though under quite different conditions of altitude at different times of the year. In winter they took it on the coast in Colima and Guerrero, and up to 3,500 feet in Chiapas. They found it rather common below a thousand feet in Campeche, Tabasco, and in eastern Puebla, and less common from 1,000 to 3,500 feet. It winters as far north as Monterey, Nuevo Leon, and occasionally reaches southern Texas. In the early fall (August 18 to September 1) it has been found from 4,000 feet in Chiapas to a little above 10,000 feet in Oaxaca.

In the Bahamas the black and white warbler is recorded from the northern half of the group to Rum Cay.[h] It is a common winter resident of the Greater Antilles, and has been taken in the Lesser Antilles as far east as St. Croix, St. Eustatius,[i] and Guadeloupe.[j] It also winters in southern Florida, and rarely as far north as St. Augustine.

Spring migration.—The earliest records of spring migration of the black and white warbler are of birds striking the lighthouses of Alligator Reef and Sombrero Key, Florida, in the first week in March.

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[a] Sclater and Salvin, P. Z. S., p. 493, 1879.

[b] Sclater and Salvin, P. Z. S., p. 780, 1870. Ernst, Rev. Cient. Univ. Venez. I, 33, 1887; Flora & Fauna Venez., p. 301, 1877.

[c] Orton, Am. Nat., V, p. 623, 1871.

[d] Bangs, Proc. N. E. Zool. Club, III, p. 63, 1902.

[e] Ridgway, Proc. U. S. Nat. Mus., X, p. 578, 1888.

[f] Salvin, Ibis, p. 246, 1888.

[g] Boucard, P. Z. S., p. 440, 1883.

[h] Ridgway, Auk, VIII, p. 338, 1891.

[i] Cory, Auk, VIII, p. 447, 1891.

[j] Lawrence, Proc. U. S. Nat. Mus., VIII, p. 621, 1885.

The full records are: Alligator Reef, March 4, 1889; Sombrero Key, March 7, 1887, March 10, 1888, and March 3 and 11, 1889.

The average date of earliest arrival at Raleigh, N. C., from 1885 to 1899, inclusive, is March 27, with extremes of March 19, 1894, and April 1, 1885. At Statesville, directly west of Raleigh and but little higher, the average date of earliest arrival in 1885, 1887, and 1888 is also March 27. Corresponding records have been received from Chapel Hill, Greensboro, and the southern part of Bertie County, while near Asheville, N. C., in the mountains, at 2,000 feet, the average date of arrival for the five years 1890 to 1894 is April 3.

The statements of writers on the migration of this species through Florida, etc., may be thus summarized: Tarpon Springs, first arrival during the last part of March; Palatka, first arrival March 13, 1885—species common March 24; first arrival at Gainesville, March 15, 1887; at Pensacola, March 21, 1885; at Perdido Light, March 22, 1885; at Shelby, Ala., March 18, 1898; at Coosada, Ala., March 13, 1878; near Beaufort, S. C., April 6, 1885, April 5, 1889, and March 29, 1887; and at Savannah, Ga., April 1, 1894. The average of nine years at Kirkwood, Ga., is April 2, with extremes of March 21, 1899, and April 10, 1895. Farther north some average dates of arrival are recorded as follows: French Creek, W. Va., April 13; Washington, April 13; Beaver, Pa., April 22; Philadelphia, April 27; Englewood, N. J., April 26; southeastern New York, April 28; central Connecticut, April 28; eastern Massachusetts, April 28; southern New Hampshire, May 1; southern Maine, May 3; Montreal, May 9; Quebec, May 12; St. John, New Brunswick, May 14; North River, Prince Edward Island, May 17.

The Mississippi Valley furnishes two extended and excellent sets of records of first arrival of this species—at Helena, Ark., and Eubank, Ky. At Helena the average for the six years from 1896 to 1901 is March 31, with extremes of March 21, 1897, and April 7, 1901. The record of eight years at Eubank, Ky., is remarkably regular for a single species at a single place: April 3, 1887, April 1, 1888, April 4, 1889, April 3, 1890, April 3, 1892, April 2, 1893, April 3, 1894, April 6, 1895, average, April 3. No records south of Helena harmonize with these. If the birds alight on the Gulf coast and then move northward, they should be abundant at New Orleans and should be seen there on the average about March 20, and sometimes several days earlier. The facts are that they are not common at any place in southern Louisiana and southern Mississippi, and the dates of arrival are late: Near New Orleans, April 8, 1898, March 31, 1899, March 25, 1900; Shell Mound, Miss., April 7, 1892; Rodney, Miss., April 2, 1889. A possible explanation of this may be that the black and white warbler prefers forests growing on high, dry land, and consequently the early, strong-flying individuals, after crossing the Gulf of Mexico, do not alight until they have passed well up into the interior, while later birds and exhausted migrants stop at the first land sighted. North of Kentucky the following records show the average date of the first birds noted: Chicago, April 30; Waterloo, Ind., May 2; northern Ohio, April 30; southern Wisconsin, May 2; southern Michigan, April 29; southern Ontario, April 29; Parry Sound district, Ontario, May 4; Ottawa, Ontario, May 7; southeastern Iowa, April 19; Lanesboro, Minn., April 28; Elk River, Minn., May 3; Aweme, Manitoba, May 8; Edmonton, Alberta, May 6, 1897; Fort McMurray, Athabasca, May 15, 1901; Fort Chippewyan, Athabasca, May 26, 1893; and Fort Simpson, Mackenzie, May 28, 1861, and May 23, 1904.

The dates of arrival of the black and white warbler in Texas, relative to the dates of its arrival in the Mississippi Valley, are earlier than in the case of any other warbler. The bird reaches northern Texas at least twelve days before it arrives at corresponding latitudes on the Mississippi River and the Atlantic coast. The fact should be particularly noted that it is found in northern Texas before it is observed in the southern part of the State. The same fact will be noted in connection with several other species. To emphasize the point the full record for Texas is given: Corpus Christi, March 23, 1878, March 31, 1898, March 13, 1899; San Antonio, March 23, 1887, March 10, 1890, March 12, 1891; 30 miles northwest of San Antonio, March 13, 1880, March 14, 1900, March 15, 1901; Austin, March 11, 1890; Dallas, March 12, 1898, March 12, 1899; Gainesville, March 18, 1886, March 11, 1887.

The species reaches central Kansas about April 15.

The following are the latest records of the black and white warbler in its winter home: Minca, Colombia, March 26; San José, Costa Rica, February 28; Yucatan, April 13; St. Croix Island, March 21; Santo Domingo, April 21, 1895; Cay Lobos lighthouse, May 2–3, 1900; New Providence, Bahamas, May 10; Key West, Fla., May 2. The latest date of striking at any of the lighthouses of southern Florida is April 26.

Fall migration.—The fall migration of the black and white warbler begins so early that within a few days after the most vigorous migrants have reached their nesting grounds on the Mackenzie River, the birds in the central part of the United States have commenced to depart for the South. The earliest dates of fall arrival at New Orleans are July 10, 1900, and July 12, 1897; at Austin, Tex., July 20, 1890, and in southern Florida, the middle of July. At this time in the year black and white warblers are found over a district in North America extending through 2,500 miles of latitude, from 25° to 62°.

During the southward migration no black and white warblers have been observed to strike the Florida lighthouses until the last week in

August, with the exception of a single individual, which struck at Sombrero Key, August 10, 1886. The heaviest flights are early in October. Even in the fall this species does not strike the light in such large numbers as several other warblers. Nearly half the records are of single birds, and but few are of more than a dozen in one night. The largest recorded destruction was on October 9, 1885. On that night it was estimated that fully 200 birds struck the light at Sombrero Key, and 25 dead ones were counted the next morning. Records of the average date of the last of the species seen are: North River, Prince Edward Island, September 4; St. John, New Brunswick, September 12; southern Maine, September 19; southeastern New York, September 24; Philadelphia, October 1; Ottawa, September 13; northern Michigan, September 7; southern Michigan, September 13, and Chicago, September 22. South of the United States the dates of arrival are early: Chiapas, Mexico, August 13, 1895; Oaxaca, Mexico (at 10,000 feet elevation), August 20, 1894; San José, Costa Rica, August 10, 1883, August 20, 1889, and August 20, 1890; Bonda, Colombia, August 21, 1898. With few exceptions, the last migrants pass through North Carolina early in October. The average for eight years of the last seen in that State was October 8, though a very late individual was noted November 10, 1885. At New Orleans the latest recorded date is October 21, 1897, and at Rodney, Miss., October 3, 1888. The only records at the Florida lighthouses later than October 11 are those of single birds that struck November 10 and 14, 1884, and of two birds on the night of November 4, 1888. The only lighthouse record from west of Florida comes from Southwest Reef, Louisiana, where, during a norther, a large number of small birds struck the light at 9 o'clock on the evening of September 29, 1886. They included six species of warblers, one of which was the black and white warbler.

637. **Protonotaria citrea** (Bodd.). Prothonotary Warbler.

Breeding range.—The prothonotary warbler is preeminently a bird of damp woods in the immediate vicinity of water, and this peculiarity seems to be the leading factor in its distribution in the United States. In general terms it can be said that it inhabits the bottom lands of the Mississippi River and its tributaries to an altitude of 1,000 feet. It is susprising how closely the limits of this range agree with the 1,000-foot contour. There are records of the occurrence of the species on the Wabash River and its tributaries to 1,000 feet at St. Mary's Reservoir in northwestern Ohio,[a] and to the same altitude in Steuben County in northeastern Indiana. The bird has been taken as far north as Hamilton, Ont., Lansing, Mich., and Shiocton, Wis. Along the Mississippi

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[a] Butler, O. & O., XIII, p. 33, 1888.

River itself it is found commonly almost to St. Paul (altitude 700 feet).[a] It passes up the Des Moines River to Des Moines (altitude 800 feet), and occurs regularly up the Missouri River to Omaha (altitude 1,000 feet). At Manhattan and Neosho Falls, Kans., which mark the western limits of the range on their respective streams, it reaches the same altitude. It has been traced up the Canadian River to Oklahoma City (a few feet below 1,000 in elevation), to the Kiowa Agency, Okla. (altitude 1,000 feet),[b] and up the Red River of Texas at least to Gainesville, at nearly the same altitude.

The only points above 1,000 feet where the occurrence of the bird is recorded are Lincoln (1,100 feet)[c] and Westpoint (1,300 feet),[c] Nebr., and near Buckhannon, W. Va., in the mountains.[d] At the last place the occurrence was accidental during the fall migration, August 3, 1888. At the other two places the species breeds.

Southwestward the bird is not uncommon in suitable localities in northeastern Texas, and breeds sparingly as far south as Houston, Austin, and Matagorda County. One was taken March 26, 1880, at Lomita Ranch, on the Rio Grande near Hidalgo.

There are equally interesting records along the Atlantic coast. From Florida to Virginia the birds are common to abundant in the heavily timbered swamps along the coast below the 100-foot contour. They are less common back from the coast. They are particularly abundant in the Dismal Swamp; breed sparingly at Raleigh, N. C.; and are recorded as breeding in a few localities in Alabama at 100 to 300 feet elevation. The species breeds throughout its regular range in the United States, except possibly in the southern half of Florida. It is a bird of the Austroriparian and Carolinian zones in the Mississippi Valley, but along the Atlantic coast is largely confined to the former, its northernmost breeding record being near the Choptank River in western Delaware. Its accidental occurrence is recorded from a number of localities along the Atlantic coast in Maryland, Pennsylvania, New Jersey, New York, Rhode Island, and Massachusetts. Even in New Brunswick one was taken in October, 1862, some weeks later than the last of the species usually leave the United States. A wanderer was taken by Mr. E. W. Nelson, May 1, 1884, at Tucson, Ariz., at 2,300 feet, the highest altitude in the United States from which any specimen is recorded.

Winter range.—The prothonotary warbler is a common winter resident of suitable localities from southeast Nicaragua[e] (where it is recorded only along the east coast) to Colombia. In Costa Rica it has been noted a few times at San José (3,500 feet),[a] and is not uncommon in the hottest part of the country of Punta Arenas on the west coast. In Panama it has been taken near Chiriqui October 16 and December 10, 1900,[b] in Veragua, and along the line of the railway. The abundance of the species in winter in Colombia is attested by the fact that fifty-eight specimens, all taken in the lowlands along the north coast, were sent to the United States by two collecting parties.[c] A specimen has been secured on the island of Trinidad,[d] one at Santa Marta, Colombia,[e] one at Valle Dupar, Colombia,[f] one in Antioquia, Colombia,[g] and one south of Merida, Venezuela.[h] These last two records show that some individuals go into the mountains in winter; for although the specimen from Antioquia has no locality marked, the itinerary of the party makes it probable that it was taken at about 4,000 feet, while Merida is at an altitude of 5,400 feet.

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[a] Roberts, Auk, XVI, p. 236, 1899.

[b] Brewster, B. N. O. C., III, p. 158, 1878.

[c] Bruner, Birds of Nebraska, p. 148, 1896.

[d] Doan, Bul. W. Va. Ag. Exp. Sta. No. 3, p. 78, 1888.

[e] Richmond, Proc. U. S. Nat. Mus., XVI, p. 483, 1893.

It is thus seen that though most prothonotary warblers winter in the same character of country that furnishes the breeding grounds, yet wanderers penetrate to higher altitudes in winter than in summer. The northern limit of the winter range is not definitely settled. Several individuals have been seen in Campeche, Mexico, during the winter,[i] and the species has been taken in January on Cozumel Island off the coast of Yucatan,[j] but it is probable that few winter regularly north of Nicaragua.

Spring migration.—There are few records of spring arrival or departure of the prothonotary warbler south of the United States. The species was once seen in Cuba in April; Schott took one at Merida, Yucatan, March 28, 1865;[k] and the parties of the Biological Survey saw a few on Cozumel Island April 4–18, 1901. The latest date at which any have been taken in Colombia is January 30. The northward movement undoubtedly begins early, for the first prothonotary warblers reach the United States by the middle of March. They appear simultaneously off the coast of Louisiana and at the south end of Florida. The earliest arrival noted in Florida was that of a bird that struck Sombrero Key lighthouse March 11, 1888. There is no record of any individual reaching northern Florida before the last of the month; the average time of recorded first arrivals is the first week in April, and the earliest dates on which any were seen are March 22, 1890, when Brewster noted one on the Suwanee River, and March 22 and 26, 1885, when many were seen around Perdido lighthouse. The average date of the arrival of the earliest prothonotary warbler in spring at Raleigh, N. C., is April 18.

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[a] Cherrie, Auk, VII, p. 335, 1890.

[b] Bangs, Auk, XVIII, p. 369, 1901.

[c] Bangs, Proc. Biol. Soc. Wash., XII, p. 143, 1898; Allen, Bul. Am. Mus. Nat. Hist., XIII, p. 178, 1900; Auk, XVII, p. 367, 1900.

[d] Léotaud, Birds Trinidad, p. 179, 1866; Chapman, Bul. Am. Mus. Nat. Hist., VI, p. 24, 1894.

[e] Sclater, Cat. Am. Birds, p. 26, 1862; Sharpe, Cat. Birds Brit. Mus., X, p. 250, 1885.

[f] Sharpe, Cat. Birds Brit. Mus., X, p. 641, 1885.

[g] Sclater and Salvin, P. Z. S., p. 494, 1879.

[h] Sclater and Salvin, P. Z. S., p. 780, 1870; Ernst, Flora and Fauna Venez, 301, 1877.

[i] Renardo, O. & O., XI, p. 118, 1886.

[j] Salvin, Ibis, p. 246, 1888.

[k] Lawrence, Ann. Lyc., N. Y., IX, p. 200, 1869.

It seems evident that the Louisiana birds do not come by way of Florida, for the average date of earliest arrival in the vicinity of New Orleans for five years was March 18, the extremes being March 13, 1888, and March 23, 1895. In the vicinity of Vicksburg, Miss., the average date of earliest arrival during four years was April 6, with extremes of April 3, 1889, and April 8, 1900, or about the same as in northern Florida. Vicksburg is but 150 miles north of New Orleans, yet the birds take, on an average, nineteen days to make the short journey. This may be explained by the observations of Prof. G. E. Beyer, who has noted that when the birds arrive on the coast of Louisiana, they seem to be very much exhausted and remain resting and feeding for several days in one locality before they continue their journey northward. The average date during six years on which the earliest arrival at St. Louis was recorded was April 21, and for five years at Keokuk, Iowa, May 9.

There is one direct observation of the migration of prothonotary warblers from their winter home to the United States. A large number were seen at noon of April 22, 1881, 30 miles off the coast of Louisiana, striving to reach the shore against a severe norther. It is interesting in this connection to note that the individual that flew against the light at Sombrero Key, March 11, 1888, as mentioned above, struck at 3 o'clock in the morning, there being a fresh wind from the north. If it started to fly at the usual time, soon after dark, the previous evening, there was not time enough for it to have come from Honduras or even from Yucatan. It probably, therefore, flew from Cuba.

The prothonotary warbler also apparently crosses the Gulf to the coast of Texas; and the few records of first arrivals in Texas—Lomita ranch, March 26, 1880; Matagorda Island, March 31, 1900; Dallas, April 8, 1898, and April 6, 1899—indicate that the birds arrive on the coast at this longitude at about the same time as farther east. The dates of earliest arrival at Manhattan, Kans., are April 25, 1891, April 26, 1894, and April 26, 1895.

Fall migration.—The prothonotary warbler is one of the most interesting species to study in its fall movements on account of its avoidance of the West Indies and Mexico. The summer birds of the Mississippi Valley pass south in the fall and eventually reach the coast of the Gulf of Mexico, with Louisiana as the center of abundance. Thence three courses are open to them: To pass through Texas and Mexico; to go east and south through Florida and Cuba; or to fly directly across the Gulf of Mexico. With respect to the first route, there are only a few records from southern Texas and none from the whole of Mexico west of Campeche. The Florida route can not be so summarily dismissed. The prothonotary warbler occurs in Florida, though at the south end it is rare, the records comprising only two individuals that struck the Sombrero Key light, four taken at Key West, one at the Dry Tortugas, and a few on the mainland. The birds are more common in northern Florida and increase in numbers northward along the Atlantic coast until southern Virginia is reached, where, as already remarked, they are abundant. Since the species occurs in spring and fall in southern Florida, it is evident that a few birds migrate through the State; but the number observed is not at all commensurate with the large number that spend the summer to the northward. In the light of the present records it would seem that the northern birds fly to their winter home without passing through southern Florida. Hence, as there are no fall records as yet of birds passing through Mexico and but few of migrants through southern Florida, it follows in the light of our present knowledge that the great bulk of the species must fly across the Gulf of Mexico from the shores of Louisiana, Mississippi, Alabama, and northwestern Florida. Their point of departure is known, but not the country toward which they direct their flight. None have been found in the West Indies except an accidental visitor to New Providence, Bahamas, August 29, 1898,[a] and the specimen taken at Havana, Cuba, in April, 1859.[b] Evidently no great number of them fly directly to northern Yucatan, for they are considered rare in that country,[c] and but few have been seen by the parties of the Biological Survey. As the species has been recorded at Truxillo[d] on the mainland of Honduras, and off the coast on the island of Ruatan,[e] we must conclude that the principal line of migration is to the moister districts of southern Yucatan and Campeche, whence the birds pass to Honduras and southward.

The earliest records of fall migration are at Raleigh, N. C., July 14, 1893 and 1894, and at Key West, July 28, 1888, and August 8, 1889. These show that migration begins as soon as possible after the young are out of the nest. Statements of observers in the Mississippi Valley are to the same effect. The migration movement in fall in the United States lasts about two months. In the latter part of August the birds leave the northern part of their range. The latest date at which they were noted at Raleigh, N. C., is August 26; the latest dates at Omaha,

[a] Bonhote, Ibis, p. 507, 1899.

[b] Gundlach, J. f. Orn., p. 178, 1862.

[c] Boucard, P. Z. S., p. 440, 1883.

[d] Ridgway, Proc. U. S. Nat. Mus., X, p. 579, 1888.

[e] Salvin, Ibis, p. 246, 1888.

Nebr., are from August 25 to September 10. The last birds to leave the United States depart late in September. The latest Florida record is of a bird that struck the light at Sombrero Key, September 25, 1888; the latest from New Orleans is September 24, 1903. The earliest recorded arrival on the coast of southeastern Nicaragua, where the prothonotary warbler is quite common in winter, was on September 2, 1892. The species has been reported as present at Valle Dupar, northeastern Colombia, on September 25.[a] Of the birds streaming down the coast some turn westward and cross the mountains, as is shown by the occurrence of the species on October 13 at San José, Costa Rica.

638. **Helinaia swainsoni** Aud. Swainson Warbler.

Breeding range.—The Swainson warbler is confined in summer to the Austroriparian life zone, where it is strictly a swamp lover. Along the Gulf coast from Louisiana to northwestern Florida it is not uncommon in the few localities that seem suited to its habits. Thence it ranges up the Wabash River to Knox County, Ind., which marks the extreme limit of the Austroriparian zone in Indiana, and to southeastern Missouri[b] on the Mississippi River. Along the Atlantic coast its range extends to the upper limit of the same zone in the Dismal Swamp of Virginia.[c] The southernmost breeding record is the lower Suwanee River in Florida. There is a record of the occurrence (probably accidental) of the species in Navarro County, Tex., August 24, 1880; and a bird struck the lighthouse at Port Bolivar, Tex., April 17, 1904.

Winter range.—So far as known the Swainson warbler is found regularly in winter only in Jamaica, where it has been taken on various dates ranging from October 1 to April 8.[d] A single bird, probably a straggler, was captured near Vera Cruz, Mexico, in the winter of 1887–88.[e]

Spring migration.—In spring migration a single specimen was taken in April at Habana,[f] one in the same month on the Bimini Islands, Bahamas,[g] and three struck the Cay Sal light-house, Bahamas, March 23–26, 1901.[h]

The earliest recorded spring arrival in the United States was on March 22, 1890, on the Lower Suwanee River. The same year the species was taken at the Tortugas March 25 and 26 and April 5. The other records of first arrival in spring are: Sombrero Key lighthouse,

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[a] Sharpe, Cat. Birds, Brit. Mus., X, p. 641, 1885.

[b] Widmann, Auk, XII, p. 112, 1895.

[c] Fisher, Auk, XII, p. 307, 1895.

[d] Merriam, Auk, II, p. 377, 1885.

[e] Salvin & Godman, Ibis, p. 236, 1889.

[f] Gundlach, J. f. Orn., p. 412, 1872.

[g] Cory, Auk, VIII, p. 296, 1891.

[h] Bonhote, Auk, XX, p. 171, 1903.

April 3, 1889; Savannah, Ga., April 8–16, 1894; Kirkwood, Ga., May 4, 1898; Frogmore, S. C., April 1–5, 1885; New Orleans, April 8, 1898, April 10–13, 1899; Bayou Sara, La., April 8, 1887; Coosada, Ala., April 12, 1878.

Fall migration.—That many Swainson warblers journey to their winter home by way of Florida is shown by the manifold records from the mainland, the records from the islands of Key West and Tortugas, and the numerous records of striking the light at Sombrero Key. There is at present only one record of the occurrence of the species in Cuba. From the numbers passing through Florida, however, it is probable that it will yet be found to be common locally in Cuba when the proper situations are examined. The occurrence of the bird at the Tortugas would seem to indicate that it migrates directly from Louisiana across the Gulf to Cuba.

Fall migration begins rather late when compared with the date of nesting. Fledged young have been seen near Charleston, S. C., by June 9, but the earliest date of striking at Sombrero Key lighthouse is August 17, 1888. Other records at this light are: September 14 and 21, 1884; September 27 and October 26, 1885; October 7, 1886; September 16, 17, and 18, 1887; September 25 and 28 and October 2 and 9, 1888. On most of these dates only one bird struck the light. The fall records at Key West are September 20, 1887, September 18–20, 1888, and the middle of September, 1889.

639. **Helmitheros vermivorus** (Gmel.). Worm-eating Warbler.

Breeding range.—The worm-eating warbler is one of the best examples of a bird of the Carolinian zone, as it breeds commonly in most places throughout the zone that are adapted to its needs, and in but few localities outside of it. It is common in the breeding season in the heavily timbered bottom lands of southern Illinois and Indiana and eastward to the lower portions of the valleys of the Hudson and Connecticut rivers. It is not uncommon in the lower parts of the Allegheny Mountains from northwestern South Carolina to southern New York, and from the Dismal Swamp of Virginia northward. Outside of this usual range it has been taken in Massachusetts, central New York, northern Ohio, southern Michigan, southern Wisconsin, central Iowa, and the southeastern corner of Nebraska and eastern Kansas. Although Mr. McCormack took a set of five eggs at La Grange, Ala., April 29, 1890, there are not many records of the breeding of the species south of the latitude of southern Virginia, except in the mountains. It is a rare summer resident at Raleigh, N. C., and in the National Museum there is a set of eggs taken May 17, 1890, by G. Mabbitt at Rodney, Miss. Beckham thought the bird probably nested at Bayou Sara, La., though he found no nests. These few instances serve but to accentuate the fact that the worm-eating warbler is found in summer but rarely outside of the Carolinian life zone.

Winter range.—The center of abundance in winter is Guatemala, where the species is generally distributed both in the mountains and along the coast. The southernmost record is that of a specimen taken at Santa Fe, Panama. Northward from this point the bird has been taken at San José, Costa Rica;[a] on the island of Bonacca,[b] off the north coast of Honduras; at Merida, Yucatan, and on the islands of Cozumel,[b] Cayman Brack,[c] and Jamaica.[d] It is a regular winter resident in Cuba, and a few individuals winter in southern Florida. One of the parties of the Biological Survey found it moderately common at Huehuetan on the coast of Chiapas, Mexico. It has been taken at Orizaba and Jalapa in the temperate region of Vera Cruz, and also along the coast of southeastern Tamaulipas, at Alta Mira.[e] The last is the northernmost record in Mexico, and the date—January 26—indicates that the bird was wintering. The westernmost point at which the species has been noted is Pachuca, Hidalgo,[f] where a few have been seen during the latter part of the winter. There are several records from the Bahamas, during November, December, and January, and the species was noted on New Providence Island[g] by the naturalists of the *Albatross* from March 23 to April 16 and on the island of Great Abaco[g] March 3. One was taken on the island of Great Inagua[h] September 22, 1891. This is to the present time the extreme southeastern record.

Spring migration.—The northward movement of the worm-eating warbler probably begins in March, as the earliest migrants have been noted at the Tortugas April 5, 1890, and the earliest records of striking at Sombrero Key are April 8, 1887, and April 3, 1889. Records for ten years give the average date of arrival at Raleigh, N. C., as April 24, with extremes of April 19 and April 30. In the mountains at Asheville, N. C., the average date for four years was April 21, which shows that the worm-eating warbler is one of the few birds seen in the mountains as early as on the plains. Other records of average date of arrival are: White Sulphur Springs and Frenchcreek, W. Va., April 28; Washington, May 2; Beaver, Pa., May 4; southeastern New York, May 7; central Connecticut, May 11; St. Louis, April 29, and Brookville, Ind., April 23. The bird was noted at Taunton, Mass., May 9, 1890. The time of arrival on the coasts of Louisiana and Texas is about the same as in southern Florida; the earliest recorded dates are

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[a] Cherrie, Auk, VIII, p. 278, 1891.

[b] Salvin, Ibis, p. 246, 1888.

[c] Cory, Auk, VI, p. 31, 1889.

[d] Scott, Auk, X, p. 340, 1893.

[e] Richmond, Proc. U. S. Nat. Mus., XVIII, p. 631, 1896.

[f] Renardo, O. & O., XI, p. 118, 1886.

[g] Ridgway, Auk, VIII, pp. 334, 335, 1891.

[h] Cory, Auk, IX, p. 49, 1892.

April 6, 1881, at Houston, Tex., and April 10, 1899, and April 7, 1900, at New Orleans. At New Orleans the migration of the species is at its height about April 20. In the southern Rio Grande region of Texas the bird has not been noted, although the avian life of the region has been thoroughly investigated; hence if it occurs it must be as a rare migrant. Houston is the southernmost point in Texas from which it has been recorded to date, and Alta Mira is the northernmost point of record in Mexico. Since the species is apparently not common west of Louisiana or north of Vera Cruz, it is probable that the principal line of migration is from Yucatan and the coast immediately west of Yucatan directly north to the northern coast of the Gulf of Mexico.

Fall migration.—The worm-eating warbler is not an early fall migrant. It begins to move south in August, and birds from the eastern part of the United States reach southern Florida by the end of August or by early in September. The species has been recorded on August 30 at Key West, and was noted at the Fowey Rocks light, September 2, 1889, and at Sombrero Key light, September 9, 1885. The six years' average of the dates on which the first southbound bird was observed to strike at any of the lighthouses is September 14.

Cuba is reached about the middle of September; in Jamaica the earliest recorded arrival was on October 7, and at San José, Costa Rica, November 23, 1890. To the westward the few dates of fall migration obtained indicate movements on the coast of Mississippi at about the same time as at the same latitude farther east.

The four years' average of closely agreeing dates of the latest migrants at Raleigh, N. C., was September 2. At New Orleans September 30 is the latest date at which the birds have been noted; at Key West, about October 1; at Sombrero Key, September 25; and at Fowey Rocks, October 5. A delayed bird was seen in northern South Carolina, October 6, and one in northern Florida, December 26.

640. **Helminthophila bachmani** (Aud.). Bachman Warbler.

When 'Bird Migration in the Mississippi Valley' was published, the Bachman warbler had just been rediscovered in the United States. The records given in that publication include all specimens taken to the spring of 1888 inclusive. Information regarding the bird then stood as follows: Besides the type, 39 specimens had been taken at Lake Pontchartrain, Louisiana, in the spring of 1886, March, 1887, and March, 1888; one had been taken at the Sombrero Key light-house; one had been seen at the same point April 24, 1887; and one had been taken by Atkins at Key West August 30, 1887.[a] In addition to these records Gundlach had reported that the Bachman warbler was a winter resident in Cuba, arriving in September, and that in his early days of collecting he used to see it quite often, but had not lately observed it.[a]

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[a] Scott, Auk, IV, p. 348, 1887.

Since 1888 enough additions have been made to our knowledge of this rare warbler to permit fuller treatment of its range and migration than was then possible. The total number of specimens taken is now about 225, and at least twice as many more have been seen. The records show that it is a pronounced swamp warbler and confined to the Austroriparian zone. It has been secured in the breeding season in North Carolina, South Carolina, Arkansas, and Missouri; as a young of the year in Virginia; in winter in Cuba, and during migration in Florida and Louisiana. These various later records may be summarized as follows:

Breeding range.—1891. One bird was taken April 27 and another May 22, at Raleigh, N. C. Both were males in breeding condition.[b]

1892. A single specimen, probably a young male of the year, was taken by Mr. P. H. Aylett in King William County, Va., in August.[c]

1896. A male was taken on May 7 and another on May 9, in Green County, Ark. Both were evidently breeding.[d]

1897. A nest in which the full complement of eggs was deposited by May 16, was found by Mr. Otto Widmann in the St. Francis River region of southeastern Missouri where the bird was ascertained to breed commonly.[e] Since these eggs are surely authentic and are unspotted, it is probable that the eggs originally described as those of Bachman warbler[f] were erroneously attributed to the bird.

1901. In the spring a male that was evidently breeding was taken at Mount Pleasant, near Charleston, S. C.,[g] which is not far from where Doctor Bachman took the type specimen in July, 1833; and a bird struck the lighthouse at Cay Sal, Bahamas, March 13.[h]

1902. A specimen was taken at Bay St. Louis, Miss., March 26.

Winter range.—The Bachman warbler has not been taken in winter outside of Cuba.

Spring migration.—1889. A large flight of Bachman warblers was observed on March 3 at Sombrero Key, Florida, and 20 females and 1 male struck the light, the male and 5 females being killed. Two of the dead birds, including the male, were sent to the Biological Survey for identification. A month later 5 females struck the light. As they struck late at night, it seems probable that they had just performed the flight from Cuba, nearly 200 miles distant. Two were shot March 21 in Brevard County, on the east coast of Florida.[i]

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[a] Gundlach, J. f. Orn., p. 411, 1872.

[b] Brimley, Auk, VIII, p. 316, 1891.

[c] Wm. Palmer, Auk, XI, p. 333, 1894.

[d] Widmann, Auk, XIII, p. 264, 1896.

[e] Widmann, Auk, XIV, p. 305, 1897.

[f] Bailey, B. N. O. C., VIII, p. 38, 1883.

[g] Wayne, Auk, XVIII, p. 274, 1901.

[h] Bonhote, Auk, XX, p. 178, 1903.

[i] Chapman, Auk, VI, p. 278, 1889.

1890. At the Tortugas, Fla., a male was taken March 26, and a female April 9.[a] During this year the birds were observed for the first time on the mainland of Florida. Spring migrants were found by Brewster and Chapman to be not uncommon on the Suwanee River.[b] The first male was taken March 12; the first female, March 15. The date of greatest abundance was March 23, when more than 30 individuals were identified. The next day was the last on which they were seen. The country traversed changed in character on that date and probably became unsuited to the species. None of the 46 specimens secured would probably have bred for several weeks.

1893. In March Arthur H. Wayne obtained about 50 specimens on the Suwanee River, Florida.[c]

1894. In the spring 8 specimens were taken in Jefferson County, Fla., along the Wacissa and Ancilla rivers.[d]

Fall migration.—1888. The following captures and observations were made at Key West[e] by Mr. Atkins: July 26, 4 taken, 20 more noted; July 28, 3 taken, 2 more noted; July 29, 2 taken, 2 more noted; August 6, 2 taken, about 22 more noted; August 8, 5 taken, about 7 more noted; August 9, 2 taken, about 6 more noted; September 5, 1 (the last) noted.

1889. Important records were again made at Key West[f] by Mr. Atkins, as follows: July 17, 1 male and 1 female noted (the earliest arrivals from the north); July 23, 3 noted; July 31, 3 noted; August 4, about a dozen noted; August 4–25, passing birds noted regularly, usually in small numbers, but reaching the maximum of 25 to 30 on August 8. None were observed after August 25. Mr. Atkins secured about 40 specimens during the time of passage.

1900. One taken at Tallahassee, Fla., August 4, and one in Madison County, La., in August.

641. **Helminthophila pinus** (Linn.). Blue-winged Warbler.

Breeding range.—The summer range of the blue-winged warbler is rather restricted, and its limits correspond quite closely with the Carolinian life zone. The center of abundance in the breeding season is central and southern Ohio, Indiana, Illinois, northern Kentucky, northern Missouri, and southern Iowa. It thus includes the lower Ohio Valley up to 1,000 feet altitude, and the valley of the Missouri, through the States of Missouri and Kansas, to the same altitude in southeastern Nebraska. To the eastward the bird avoids the mountains entirely, even in migration, but breeds rarely and locally in some of the lower parts of southern Pennsylvania and Maryland (one record). There is a local colony, where it is almost common, that includes southeastern

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[a] Scott, Auk, VII, p. 313, 1890.

[b] Brewster, Auk, VIII, p. 149, 1891.

[c] Wayne, Auk, X, p. 338, 1893.

[d] Wayne, Auk, XII, p. 367, 1895.

[e] Scott, Auk, V, p. 428, 1888.

[f] Scott, Auk, VII, p. 16, 1890.

New York and adjoining parts of New Jersey and Connecticut. The bird occurs in western New York and through southern Michigan to southern Minnesota. In the Austroriparian zone it breeds very rarely, as but three recorded instances are known: in the Creek Nation, Indian Territory; on the St. Francis River, in extreme southeastern Missouri, and on the coast of Georgia near the mouth of the Altamaha River.

Migration range.—Through most of the Austroriparian region of the Southern States the species is a migrant, but is nowhere recorded as even tolerably common. Along the south Atlantic coast it occurs as a rare migrant in spring and fall, and all the records come from below the 500-foot contour. There are single records from South Carolina and Georgia, a few from Alabama and Louisiana, and quite a number from eastern Texas, even to the Rio Grande.

Winter range.—In winter, so far as noted, the blue-winged warbler is quite widely distributed, but is nowhere common. A single specimen was taken at Metlaltoyuca, Puebla, February 22, 1898, by one of the parties of the Biological Survey. On four other occasions the species has been taken in Mexico, in each instance in the State of Vera Cruz. Its special winter home seems to be in Guatemala, where it has been found from near sea level to an elevation of 4,000 feet. The only locality on the Pacific slope at which it has been recorded is Retalhuleu in southwestern Guatemala, at about 1,000 feet altitude. On the mainland east of Guatemala there are five records of its occurrence. An individual was taken by Gaumer in northern Yucatan,[a] and another by Dyson in Honduras;[b] one was seen February 8, 1892, and one January 17, 1893, along the coast of southeastern Nicaragua;[c] and one was taken March 21, 1899, at Chirua, Colombia,[d] at 7,000 feet altitude—the only record of the occurrence of this species in South America. In the West Indies, excepting the specimen taken on the island of Abaco, Bahamas, April 7,[e] its presence has never been recorded.

Spring migration.—South of the United States no notes of blue-winged warblers in migration have been recorded except in the single instance of an individual seen April 7, 1897, at Jalapa, Vera Cruz;[f] but northward migration must commence in March, as the earliest recorded arrival from the South at New Orleans is March 22, 1898. Spring records from the mainland of Florida are lacking, but three individuals were noted on the Dry Tortugas, March 23, 1890, and another individual on each of the next two days. The species wa noted at Shelby, Ala., April 4, 1898; Washington, April 26, 1891 and, on the average, at Beaver, Pa., May 3, Englewood, N. J., May 4, southeastern New York, May 4, and Portland, Conn., May 12. It was seen at Framingham, Mass., May 13, 1896. Excellent record wa kept of its arrival for eight consecutive years at Eubank, Ky. (wher it breeds somewhat commonly), the details of which may be thu tabulated:

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[a] Boucard, P. Z. S., p. 440, 1883.

[b] Sharpe, Cat. Birds, Brit. Mus., X, p. 239, 1885.

[c] Richmond, Proc. U. S. Nat. Mus., XVI, p. 483, 1893.

[d] Bangs, Proc. Biol. Soc., Wash., XIII, p. 105, 1899; Allen, Bul. Am. Mus. Nat. Hist. XIII, 178, 1900; Auk, XVII, p. 367, 1900.

[e] Ridgway, Auk, VIII, p. 334, 1891.

[f] Chapman, Bull. Am. Mus. Nat. Hist., X, p. 24, 1898.

Arrival of blue-winged warbler at Eubank, Ky.

Year.	First noted.	Next noted.	Species became common.
1888	Apr. 14	Apr. 15	Apr. 15
1889	Apr. 13	Apr. 14	Apr. 18
1890	Apr. 13	Apr. 14	Apr. 14
1891	Apr. 15	Apr. 16	Apr. 18
1892	Apr. 21	Apr. 22	Apr. 25
1893	Apr. 10	Apr. 11	Apr. 13
1894	Apr. 16	Apr. 25	Apr. 27
1895	Apr. 12	Apr. 22	Apr. 25
Average	Apr. 14	Apr. 17	Apr. 19

The average date of earliest spring arrival during seven years a St. Louis is April 22, with extremes of April 17, 1883, and April 24 1884. At Brookville, Ind., the average date of arrival is April 26 and the earliest April 17, 1896. Other records of average date o the first seen are: Rockford, Ill., May 6; Petersburg, Mich., May 10 Keokuk and Grinnell, Iowa, May 4; Lanesboro, Minn., May 14 Recorded arrivals in Texas are: Fort Brown, April 20, 1886; Brownsville, April 10, 1890; Refugio County, April 12, 13, and 14, 1887 Corpus Christi, April 7 and May 1, 1884; San Antonio, April 14, 16 and 24, 1890, and May 12, 1891; and Waco, April 29, 1900. At Onaga Kans., near the western limit of the range, the average for five year was May 4, with extremes of May 1, 1892, and May 8, 1898.

Fall migration.—While the bulk of the blue-winged warblers mov south in August and early September, a few of the birds remain fo several weeks longer. The average date of the last noted at Lanesboro, Minn., is August 28, and the latest date September 1, 1889 The last bird was seen at Providence, R. I., October 10, 1897. Th average date of the last seen during four years at New Providence N. J., was October 3, and the latest October 12, 1894. Other record of the last seen are: Lynchburg, Va., October 8, 1899; French Creek W. Va., October 10, 1891; Raleigh, N. C., September 4, 1888; Lebanon Ind., October 22, 1894; Eubank, Ky., September 13, 1889, and Ne Orleans, September 18, 1901. Most of the individuals of the specie migrate across the Gulf of Mexico, apparently avoiding Florida on th east and Texas and Vera Cruz on the west, as there is no record of th occurrence of this warbler in fall in Texas, and but one in Florida— that of a bird taken at Key West August 30, 1887.

642. Helminthophila chrysoptera (Linn.). Golden-winged Warbler.

Breeding range.—The bulk of the golden-winged warblers breed in an area rather restricted, but the summer home of the species as a whole is quite extended. The center of abundance is Michigan, lower Ontario, and northern Wisconsin. A few individuals pass westward to eastern Minnesota, and accidental visitants have been noted at Winnipeg, Manitoba. The species breeds sparingly in northern Illinois, northern Indiana, and extends eastward through New York to southeastern New Hampshire, Massachusetts, Connecticut, and northern New Jersey. The southern limit of the breeding range, which is not well settled, takes a southerly dip in the mountains from Pennsylvania to northern Georgia, where at 2,000 to 4,000 feet elevation the bird is locally almost as common as in Michigan. The summer range thus coincides almost exactly with the Alleghenian zone, marking the golden-winged warbler as one of the few species whose breeding range is practically confined to the zone.

Migration range.—The species is recorded as occurring in eastern Missouri and eastern Iowa in migration, but it is not yet known in Kansas, and the earlier records of its appearance in Nebraska are not corroborated by later observations. One accidental occurrence in New Mexico has been recorded.

Winter range.—The records show that most golden-winged warblers spend at least five months of the year in the mountains of Central and South America, though a few occur along the coast. The principal winter home seems to extend from southern Nicaragua to Costa Rica, Panama, and Colombia. The species has been noted in winter in northern Guatemala at Vera Paz above 4,000 feet. It has not been recorded as occurring in Honduras or western Nicaragua and is rare in Mexico, as shown by the fact that it has never been taken there by any of the parties of the Biological Survey. One of Gould's specimens in the National Museum is marked Mexico; Renardo records a few seen in the winter season of 1885–86 at Campeche and Merida,[a] and a single specimen was taken by A. E. Colburn at Paso Nuevo, Vera Cruz, March 16, 1901. These are the only records of the occurrence of the bird in Mexico. There is but one record of its occurrence in Cuba, this being in April.

In Costa Rica it was noted in September, 1889, and October, 1890, at San José,[b] and in the fall of 1895 on the west slope of the mountains at 1,400 to 2,000 feet.[c] It is uncommon in winter along the coast of southeastern Nicaragua,[d] where, however, specimens were taken November 5, 1892. In Panama it has been taken quite frequently, the specimens coming both from lowlands and from as high as 7,700 feet in the mountains.

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[a] Renardo, O. & O., XI, p. 118, 1886.

[b] Cherrie, Auk, VII, p. 335, 1890; VIII, p. 278, 1891.

[c] Underwood, Ibis, p. 433, 1896.

[d] Richmond, Proc. U. S. Nat. Mus., XVI, p. 483, 1893.

The southernmost extension of the winter range is apparently Colombia, where the species has been taken at Bogota,[a] in the Santa Marta region at Minca (2,000 feet)[b] and Las Nubes (5,000 feet),[c] and in Antioquia at Medellin (5,000 feet),[d] and still higher in the mountains (above 6,000 feet).[e] During migration it has been taken on the north coast at Bonda[f] and in the neighboring mountains at Pueblo Viejo (8,000 feet).[g]

Spring migration.—The golden-winged warbler is a late migrant in the spring. It has been noted south of the United States (in Colombia) as late as March 20, 1898, while the earliest record of its spring arrival in the Gulf States was made at Rising Fawn, northwestern Georgia, April 11, 1885. At St. Louis, Mo., the average date of spring arrival during six years was May 1. The species has a more restricted migratory range than would be judged from the extent of its breeding ground. There are no records of its occurrence in spring in the coast region of South Carolina, Georgia, or Alabama, and but one at any point in Florida. Its only recorded occurrences on the coast have been near Galveston, Tex., and in Louisiana and Mississippi. It was not noted in spring by Loomis in Chester County, S. C., during fourteen seasons of collecting; and Brimley in sixteen years at Raleigh, N. C., saw it only twice in spring—May 7, 1889, and May 7, 1891. It has been seen but twice in the mountains at Asheville, N. C.—April 22, 1893, and April 27, 1899. Farther north it has appeared on the average at Frenchcreek, W. Va., May 2; Washington, May 3; Beaver and Waynesburg, Pa., April 30; Portland, Conn., May 10; near Boston, May 10. The single record of the golden-winged warbler for New Hampshire is Durham, May 24, 1898. The average date of the first of the species seen at St. Louis is May 1, the earliest April 27, 1882. Other records which show average dates are: Chicago, May 5; Rockford, Ill., May 7; Waterloo, Ind., April 30; Wauseon, Ohio, May 4; Petersburg, Mich., May 4; southern Ontario, May 6; Keokuk, Iowa, April 30. Records of the earliest bird seen are: North Freedom, Wis., May 10, 1902; Lanesboro, Minn., May 8, 1887; Elk River, Minn., May 12, 1888; St. Vincent, Minn., May 9, 1896. An individual of the species was taken at Coleto Creek, Texas, May 3, 1887, and one struck the light at Port Bolivar, Tex., May 6, 1903.

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[a] Sclater, P. Z. S., p. 143, 1855; Cat. Am. Birds, p. 28, 1862; Baird, Rev. Am. Birds, p. 175, 1864.

[b] Sclater and Salvin, Ibis, p. 117, 1880.

[c] Specimen in the Carnegie Museum, Pittsburg, Pa.

[d] Sharpe, Cat. Birds Brit. Mus., X, p. 237, 1885.

[e] Sclater and Salvin, P. Z. S., p. 494, 1879.

[f] Allen, Bull. Am. Mus. Nat. Hist., XIII, p. 178, 1900; Auk, XVII, p. 367, 1900.

[g] Bangs, Proc. Biol. Soc. Wash., XII, p. 160, 1898.

Fall migration.—Although tardy in spring, the golden-winged warbler is one of the earliest of fall migrants. The birds which descend the Mississippi Valley usually reach the coast of Louisiana during the fore part of August, and the first arrival from the North at New Orleans has been recorded as early as July 23, 1898. Farther migration southward is made rapidly, for the birds appear in August in the mountains of Costa Rica, and one was taken as early as September 6 on the north coast of Colombia. The earliest fall migrant was seen at Washington August 8, 1889. The earliest fall arrivals recorded by Loomis in Chester County, S. C., were on August 20, 1887, and August 28, 1888. At Raleigh, N. C., a specimen was taken August 26, 1886; and several were seen August 9–19, 1890, at Greensboro, Ala. Records of the last of the species seen in the United States are: Lanesboro, Minn., September 8, 1889; Livonia, Mich., September 21, 1891; Chicago, September 25, 1895; Englewood, N. J., September 2, 1886; Frenchcreek, W. Va., September 15, 1892; Chester County, S. C., September 22, 1887, and New Orleans, September 21, 1897. Some exceptionally late birds were reported as seen at Grand Rapids, Mich., October 4, 1886.

The principal path of migration followed by the golden-winged warblers of the Allegheny region extends from the southern end of the Allegheny Mountains south across the Gulf of Mexico to the forested regions of Central America, and thence southeast to South America. East of this path the species has been noted during the fall migration at Key West, August 25, 1889, and once in April at Habana, Cuba, during the northward movement.

643. **Helminthophila luciæ** (Cooper). Lucy Warbler.

The Lucy warbler breeds in Arizona and southwestern Utah, and migrates in winter to northwestern Mexico. Its arrival was noted in Arizona at Fort Lowell, March 20, 1902; Oracle, April 1, 1899; Fort Mojave, March 25, and at Whipple Barracks, March 31, 1892.

644. **Helminthophila virginiæ** (Baird). Virginia Warbler.

The Virginia warbler breeds in the Rocky Mountains as far north as Wyoming and Utah, and from Colorado to Nevada. It is one of the commonest breeding warblers in Colorado, at altitudes ranging from 5,000 to 7,500 feet, but is not found east of the foothills. It retires in winter to Mexico, where it has been taken by the parties of the Biological Survey as far south as Morelos and Guerrero. The first migrant was seen at Cooney, N. Mex., April 10, 1889, and at Huachuca, Ariz., April 10, 1902.

45. **Helminthophila rubricapilla** (Wils.). Nashville Warbler.

Breeding range.—The breeding range of the Nashville warbler xtends from Massachusetts and Connecticut westward to northern

Illinois, and northward to Saskatchewan (Cumberland House) in the west and Cape Breton and Gaspé Bay in the east. The species is a rare visitor to Newfoundland. The southern limit of the breeding range coincides quite closely with the southern boundary of the Alleghenian zone. The bird breeds more commonly in New England than elsewhere in the United States, becoming less and less common to the westward.

Winter range.—The principal winter home of the Nashville warbler is southern and eastern Mexico, in Puebla, Vera Cruz, eastern Oaxaca, Chiapas, and Campeche, and includes both highlands and lowlands. The parties of the Biological Survey found the species rather common in the open woods of the coffee plantations near Motzorongo, Vera Cruz, only 800 feet above sea level, and equally common at 3,000 feet in Chicharras, Chiapas, near the Pacific coast. They found it in the interior at 3,000 feet at Piaxtla, Puebla, and in the mountains of Oaxaca to about 8,000 feet. It was taken in the last of September, 1892, in the mountains of San Luis Potosi at 8,000 feet. In mild winters the species is found as far north as the Rio Grande of Texas. It also occurs in Guatemala, but probably only as a rare straggler, as there is no recent record of its occurrence.

Spring migration.—Although the Nashville warbler is a familiar bird in eastern Texas and in New England, it is scarcely known in the southeastern part of the United States. In the District of Columbia it is a rare migrant. In North Carolina it is rare in the mountains and is scarcely recorded elsewhere. In South Carolina it was not seen by Loomis during fourteen years of careful collecting, and seems to have been recorded but once in the State. In Florida one accidental occurrence is known, and the bird has apparently not been recorded from Alabama, Mississippi, or Louisiana. It is also unknown in the West Indies and South America, and is practically absent from Central America.

Assuming that the northward migration route of eastern birds follows the direct course along the western slope of the Alleghenies, the dates of arrival of the Nashville warbler in New England should be considerably later than those at corresponding latitudes in the Mississippi Valley, whereas there is but little difference between them. Some records of average date of arrival are: Frenchcreek, W. Va., April 28; Washington, May 5; Beaver, Pa., May 1; New Providence, N. J., May 4; southeastern New York, May 3; Portland, Conn., May 7; Boston, May 5; Randolph, Vt., May 7; southern New Hampshire, May 5; Lewiston, Me., May 9, and St. John, New Brunswick, May 16. The first arrival was seen at Montreal, May 10, 1890; Quebec, May 14, 1890; Scotch Lake, New Brunswick, May 9, 1902, and Petitcodiac, New Brunswick, May 5, 1886. The average date of arrival at St. Louis is April 26; at Chicago, May 3; in northern Ohio, May 5;

at Petersburg, Mich., May 7; in southern Ontario, May 6, and at Ottawa, May 14. Similar records west of the Mississippi are: Keokuk, Iowa, May 6; Grinnell, Iowa, May 5; Lanesboro, Minn., May 9, and Minneapolis, May 14. The Nashville warbler enters southern Texas the last of March; it was noted near Hidalgo, March 15, 1880, and at San Antonio, March 30, 1880, March 21, 1889, March 27, 1890, and March 27, 1891. These dates compared with those of earliest arrival at St. Louis indicate a fair rate of speed, 27 miles per day, between Texas and St. Louis. But on the assumption that the breeding birds of Massachusetts also enter Texas the last of March, their average daily speed must be nearly twice as great as that of the St. Louis birds. Many more data on the movements of this species are required before the routes of migration can be determined with satisfactory exactness. In spring migration the bird has been seen at San Antonio, Tex., as late as May 12, 1891. The last northward migrants leave St. Louis about May 20.

Fall migration.—The earliest migrating Nashville warblers are scarcely seen south of their breeding grounds before the middle of August. First migrants have been noted at Chicago, August 16, 1896; Beaver, Pa., September 5, 1903; Ossining, N. Y., August 11; Englewood, N. J., August 26, 1887; Washington, September 5; Frenchcreek, W. Va., September 7, 1890; St. Louis, September 17, 1885, and Gainesville, Tex., October 11, 1885. The average date of the last seen at Lanesboro, Minn., is September 27; at Ottawa, September 20; at St. John, New Brunswick, September 2; in southern Maine, September 11, and at Renovo, Pa., September 26.

645a. **Helminthophila rubricapilla gutturalis** (Ridgw.). Calaveras Warbler.

The Calaveras warbler inhabits the Pacific slope, breeding from central California north to British Columbia and east to the Rocky Mountains. Its migration is a simple movement south and southeast by land to Mexico. The parties of the Biological Survey found this western form common during the winter at sea level in Colima and Guerrero, at 7,000 feet in the mountains of Jalisco, and at elevations ranging to 8,000 feet in the mountains about the valley of Mexico. The southernmost point from which it is recorded is Sta. Efigenia, Oaxaca, where it was taken by Sumichrast December 24, 1868. A few individuals may occasionally winter in southern California, as the species was seen February 3 and 9, 1895, at San Bernardino. The arrival of the first in spring was noted at Yuma, Ariz., March 11, 1902; Twin Oaks, Cal., March 24, 1889; Huachuca Mountains, Arizona, April 1, 1902; Dunlap, Cal., April 23, 1891, and Revelstoke, B. C., May 9, 1890. The last was seen in fall at Dunlap, October 12, 1890, and at Cooney, N. Mex., September 30, 1889.

646. Helminthophila celata (Say). Orange-crowned Warbler.

Breeding range.—The principal summer home of the orange-crowned warbler is from Manitoba northwest to Kowak River, Alaska. This may be considered the normal home, but many of the species find congenial boreal conditions in the Rocky Mountains. The species has been taken in several localities in the mountains of Colorado, where it breeds not uncommonly from 6,000 to 8,000 feet and less commonly 1,000 feet higher. Its occurrence in the Rocky Mountains, however, is more frequently that of a migrant. Manitoba marks the eastern limit at which the species is common; thence to New Brunswick it is of rare occurrence, though strangely enough it was once found breeding at Brunswick, Me. It probably also breeds rarely in Wisconsin.

Winter range.—In migration the orange-crowned warbler has been taken along the Atlantic coast from Massachusetts to Key West. It winters rarely and irregularly as far north as Charleston, S. C., and along the Gulf coast to the Rio Grande. It has sometimes been seen in winter in quite large numbers near New Orleans; is a common winter bird in extreme southern Texas, and occasionally occurs as far north as San Antonio. There is no West Indian record of its occurrence as yet, though on October 5, 1887, and for a few days afterward, it was not uncommon at Key West, Florida.

The winter home of the great bulk of the species is northeastern Mexico. It is generally distributed in the eastern Cordillera and over that portion of the table-land of Mexico that lies east of these mountains, south to the mountains about the valley of Mexico and to Mount Orizaba. At the northern limit of its winter range it is found from sea level along the coast of Texas to 2,000 feet on the table-lands of northern Nuevo Leon. Farther south it passes to higher altitudes, occurring at 6,000 to 10,000 feet in San Luis Potosi, Guanajuato, Hidalgo, and Puebla. It is very common in the vicinity of Mount Orizaba, Vera Cruz. On the Pacific coast of Mexico, as shown by material secured by field naturalists of the Biological Survey, it is replaced by its western form *lutescens*.

Spring migration.—By the first week in March the orange-crowned warbler begins to move into the lower lands of Texas, but during the first half of the month seems to make little progress beyond the region in the southern part of the State, where it often winters. Even in the vicinity of San Antonio, Tex., most of the dates of arrival are as late as the last week of March. The first bird was seen April 17, 1902, near the San Pedro River in southern Arizona. The records made at Onaga, Kans., show arrival on April 17, 1892; April 26, 1895; April 17, 1896; April 24, 1897; and April 25, 1898: average, April 24. Eastward the species arrives at St. Louis on the average on April 27, and to the westward it reaches the same latitude at the base of the mountains in Colorado May 2–5. The average date of arrival at Chicago is May 6, in southern Ontario May 13, and at Ottawa May 18. The averages for seven years at Lanesboro, Minn., and Aweme, Manitoba, are May 2 and May 7, respectively. The first arrival was seen at Red Deer, Alberta, May 14, 1892; Fort Chippewyan, Athabasca, May 23, 1901; Fort Resolution, Mackenzie, May 22, 1860; Fort Simpson, Mackenzie, May 21, 1904; and on the Kowak River, Alaska, May 25, 1899. The species is so rare along the Atlantic coast that no regular northward movement in that region can be traced.

Some of the recorded dates of latest occurrence in spring are as follows: At Gainesville, Fla., April 11, 1887; at Coosada, Ala., April 15, 1878; near Beaufort, S. C., April 29, 1885; in Chester County, S. C., April 24, 1889; at New Orleans, March 11, 1894; at Corpus Christi, Tex., April 22, 1891; at San Antonio, Tex., April 30, 1890, and at Dallas, Tex., April 30, 1898. The last orange-crowned warblers to leave the southern limit of their winter range in Mexico take their departure the first week in April, and about a month later the latest northward migrants pass through central Missouri.

Fall migration.—But few records have been made of the fall movements of this species. It is never common in the fall at St. Louis, but has been noted there on different dates ranging from September 9 to October 26. The record of a single individual at Key West, Fla., September 8, 1889, is certainly very early. The last were noted near latitude 64° north of Fort Rae, Mackenzie, August 16, 1903; at Aweme, Manitoba, October 3, 1901; Lanesboro, Minn., October 6, 1891; Ottawa, September 30, 1889; Chicago, October 1, 1896; and Berwyn, Pa., November 29, 1894. Other fall records are Cambridge, Mass., September 30 and October 2; Lynchburg, Va., September 22, 1898; Chester County, S. C., October 21, 1887; Charleston, S. C., November 27; Key West, October 5; San Angelo, Tex., September 4, 1885; and San Pedro River, Arizona, near the Mexican boundary, October 11, 1892. By the last of November the species has become common at the southern limit of its winter range.

This warbler makes no migration by water, so far as known, but reaches its winter home entirely overland.

646a. **Helminthophila celata lutescens** (Ridgw.). Lutescent Warbler.

This Pacific slope form of the orange-crowned warbler breeds from southern California to southern Alaska and east to the mountains of Nevada. It winters southward from central California, and has been found in winter by the parties of the Biological Survey throughout western Mexico in Chihuahua, Sinaloa, Jalisco, Colima, and Morelos, and from the coast to interior points 6,000 feet above sea level. The lutescent warbler arrives about March 12 in central California, and about March 23 in northern Oregon. It was noted at Chilliwack, British Columbia, April 17, 1889. In the Huachuca Mountains of Arizona during 1902 the bird appeared April 8 and departed May 5. The average date of arrival for five years at Columbia Falls, Mont., is May 5, and the earliest, April 30, 1897.

646b. **Helminthophila celata sordida** Towns. Dusky Warbler.

A resident form on the Santa Barbara Islands, California, known also to have occurred on the mainland at Pasadena.

647. **Helminthophila peregrina** (Wils.). Tennessee Warbler.

Breeding range.—The Tennessee warbler is common in migration in the Mississippi Valley, but is rather rare east of the Allegheny Mountains. It occurs in summer in northern New England, and has also been noted in northern New York and northeastern Minnesota. It ranges north to the upper Yukon Valley, eastern British Columbia, Nahanni River and Fort Wrigley in Mackenzie, Quebec, Labrador, and the Gulf of St. Lawrence. An accidental occurrence has been noted in California. During the summer of 1901 one of the parties of the Biological Survey took two sets of eggs at Fort Smith, Mackenzie. These eggs are among the first absolutely authentic specimens known to science.

Winter range.—During the winter this warbler is rather common in northern Guatemala, and one of the parties of the Biological Survey found it at an elevation of 10,000 feet on the volcano of Santa Maria where it was quite common, January 21–28, 1896. It was taken by Sumichrast at Sta. Efigenia, Oaxaca, Mexico, January 3 and 14, 1869, and was previously found by Boucard in the same State. It has twice been noted at Jalapa, Vera Cruz. The only Yucatan record is from the island of Cozumel. The only Honduras records are from San Pedro near the northwest coast, and the islands of Bonacca and Ruatan somewhat farther east. These records, taken in connection with the fact that the Tennessee warbler is abundant in fall on the southeastern coast of Nicaragua and occurs in Costa Rica and Panama, seem to show that the bird migrates along the Atlantic side of Central America. But for the present there is nothing to indicate that it passes inland to the mountainous districts of Honduras or Nicaragua, or that there is any southeastward migration along the mountains from Guatemala to Costa Rica.

In Colombia, South America, the Tennessee warbler has been taken in the fall on the north coast at Bonda,[a] and during the winter in the mountains of the Santa Marta region at Minca (2,000 feet),[b] Onaca (2,500 feet),[a] Valparaiso (4,500–5,500 feet),[a] and Las Nubes (5,000 feet).[a] It is reported from Bucaramanga (3,000 feet),[c] and in the same vicinity at Herradura (4,000 feet).[a] One of the highest recorded altitudes is Concordia (6,000 feet)[b] in Antioquia. Other records in South America are at Santa Marta, Colombia,[c] and at Caracas, Venezuela.[d] One of Boucard's specimens in the National Museum is marked "Merida, Venezuela, 1889." The winter records are made almost entirely in the mountains, but not nearly at such high altitudes as one might expect from the boreal habit of the bird in the United States and Canada.

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[a] Allen, Bull. Am. Mus. Nat. Hist., XIII, p. 178, 1900; Auk, XVII, p. 367, 1900.

[b] Salvin and Godman, Ibis, p. 117, 1880.

[c] Berlepsch, J. f. Orn., p. 282, 1884.

Spring migration.—In spring migration the Tennessee warbler is rarely found east of the Alleghenies, nor is it so common in the Mississippi Valley as during the fall migration. It is one of the late migrants, reaching latitude 37° about April 27, as shown by the following dates of arrival: Rising Fawn, Ga., April 26, 1885; southwestern Missouri, April 27, 1874; Acton, Ky., April 29, 1901; and St. Louis, April 25, 1882, April 25, 1883, April 29, 1884, April 28, 1885, April 24, 1886, April 28, 1887, and April 27, 1888—average, April 27. Northern records of average date of arrival are: Beaver, Pa., May 9; central New York, May 13; eastern Massachusetts, May 14; Brookville, Ind., May 4; Chicago, May 9; southern Wisconsin, May 16; southern Michigan, May 15; Ottawa, May 16; Grinnell, Iowa, May 5, and Lanesboro, Minn., May 11.

The Biological Survey has received no notes from the South Atlantic States on the spring migration of the Tennessee warbler, nor from Alabama, Mississippi, or Louisiana, though two birds were seen in April in Cuba[e] and some were taken on the island of Grand Cayman,[f] and the species has been noted several times in spring at Pensacola, Fla. The few notes from farther west indicate the arrival of the bird at Corpus Christi, Tex., April 3, 1891; Bee County, Tex., April 18, 1887; San Antonio, Tex., April 21, 1891; Manhattan, Kans., May 2, 1893; Lincoln, Nebr., May 7; Aweme, Manitoba, May 13, 1903; Fort Simpson, Mackenzie, May 26, 1860, and Caribou, British Columbia, May 22, 1901. Six records have been made of the occurrence of this species in Colorado, where during the early days of May, at the western limit of its range, it is a rare migrant along the base of the eastern foothills.

The latest dates of departure south of the United States are at Valparaiso, Colombia, April 4; Minca, Colombia, March 26; San José, Costa Rica, March 6, 1889; and Jalapa, Vera Cruz, April 18, 1897. The latest at St. Louis, Mo., were May 21, 1884, May 22, 1885, May 15, 1886, May 14, 1887, and May 20, 1888.

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[a] Wyatt, Ibis, p. 322, 1871.

[b] Sclater and Salvin, P. Z. S., p. 494, 1879.

[c] Bangs, Proc. Biol. Soc. Wash., XII, p. 143, 1898.

[d] Sharpe, Cat. Birds, Brit. Mus., X, p. 242, 1885.

[e] Gundlach, J. f. Orn., p. 412, 1872.

[f] Cory, Cat. W. I. Birds, p. 117, 1892.

Fall migration.—The Tennessee warbler begins to move southward in August from its summer home. It was noted at Hallock, Minn., August 2, 1899; Mackinac Island, Michigan, August 8, 1889; Chicago, August 13, 1896; Englewood, N. J., August 26, 1887; and Washington, August 31, 1890. Arrivals of the earliest southbound migrants were recorded at Asheville, N. C., September 13, 1890, and September 10, 1894. In Chester County, S. C., in eleven years' observation, the earliest date of arrival from the north was September 8.

Few Tennessee warblers pass through Florida to the West Indies. Two specimens were taken on October 5 and 6, 1887, at Key West, but there are no other records of the occurrence of the species in southern Florida. The bird, however, undoubtedly passes regularly through western Florida, as it does through Mississippi and Louisiana. At Eubank, Ky., the earliest record of a fall migrant was September 9, 1887. The earliest birds were seen at New Orleans September 23, 1896, September 22, 1897, and September 18, 1899. Some individuals pass through eastern Texas into Mexico, and migrants have been taken at Jalapa, Vera Cruz.[a] The species was taken in September on the island of Bonacca, Honduras,[b] and on the coast of southeastern Nicaragua, October 24, 1892.[c] Several Tennessee warblers were seen at San José, Costa Rica, September 17, 1889, the next noted in that year arriving October 14. The earliest arrival in the following year was on October 20.[d] Von Frantzius records that he saw the Tennessee warbler in August in Costa Rica, but if there was no mistake in identification, the occurrence must have been accidental. The earliest date of arrival at Bonda, on the north coast of Colombia, is November 3.[e] These records show that the principal line of migration is from the Mississippi Valley across the Gulf of Mexico to Mexico and Central America. The eastern part of this route probably extends from the southern end of the Alleghenies across northwestern Florida to the coast of Yucatan and Honduras.

The Tennessee warbler is quite slow in leaving the United States. As late as October it occurs throughout the whole of the eastern part of the United States, from the Great Lakes to the Gulf. Though it leaves the northern part of this region early in the month, it lingers in the southern part until its close. Some records of latest departure are: Aweme, Manitoba, October 3, 1901; Grinnell, Iowa, October 1, 1886; Ottawa, September 30, 1889; Palmer, Mich., September 27, 1894; Chicago, October 9, 1894; Beaver, Pa., October 11, 1890; Washington, October 12, 1890; St. Louis, October 20, 1885; Asheville,

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[a] Chapman, Bull. Am. Mus. Nat. Hist., X, p. 24, 1898.

[b] Salvin, Ibis, p. 247, 1888.

[c] Richmond, Proc. U. S. Nat. Mus., XVI, p. 484, 1893.

Cherrie, Auk, VII, p. 335, 1890; Auk, VIII, p. 278, 1891.

Allen, Bull. Am. Mus. Nat. Hist., XIII, p. 178, 1900.

N. C., October 29, 1894, and New Orleans, October 30, 1894, November 1, 1895, October 27, 1896, October 21, 1897, October 25, 1899, and November 3, 1900. This protracted migration is quite different from that noted on the coast of Nicaragua. Richmond reports that in 1892 the first arrivals were noted October 24; that two days later the birds were very abundant; that during the next three days hundreds were seen daily, and that after this none were seen. At San José, Costa Rica, where Tennessee warblers are common all through the winter, they were reported as abundant by October 27. The fact also that the species was seen in Costa Rica by September 17 in 1889 would indicate that migration over this part of the route is quite rapid.

648. Compsothlypis americana (Linn.). Parula Warbler.
648a. Compsothlypis americana usneæ Brewster. Northern Parula Warbler.

Present knowledge of the parula warbler does not allow separate treatment of the two forms, *americana* and *usneæ*, as regards winter range or migration, but the boundaries of the breeding ranges can be defined from information already secured.

Breeding range.—The southern form of the parula warbler, true *americana*, breeds locally in the Gulf States from Alabama to Florida and more commonly up the Atlantic slope to the District of Columbia and probably also in Delaware and southern New Jersey. Individuals have been taken casually in Pennsylvania and New York. The range thus practically coincides with the Austroriparian zone, and its northern limits with those of the Spanish moss, in whose festoons *americana* commonly nests.

The northern parula warbler—including under this head the individuals that have lately been segregated as the subspecies *ramalinæ*—breeds commonly in the northeastern part of the United States as far north as Maine, and rarely visits or breeds in New Brunswick, Nova Scotia, and Prince Edward Island. It is common in the Alleghenies, and ranges up to 2,700 feet in the Catskills and the higher mountains of Pennsylvania and Virginia. Along the northern limit of its range it is rare in southern Ontario, southern Michigan, and across Wisconsin to southeastern Minnesota. It is recorded from Mackinac Island in northern Michigan, and is one of the warblers that has struck the light-house near there on Spectacle Reef. It is reported as breeding in St. Louis County, northeastern Minnesota. Its regular range extends westward across Iowa to southeastern Nebraska, and thence southward through Indian Territory to Texas. It has been taken casually in the Black Hills of South Dakota and twice in Wyoming, and is a rare visitant in southeastern Colorado.

Winter range.—The range in Mexico of the species as a whole has been accurately determined by the parties of the Biological Survey. They found it wintering abundantly in southern Vera Cruz, Tabasco, Campeche, and Yucatan, both on the coast and in the lower districts. It is found sparingly southwest to Oaxaca and reaches the Pacific slope at Tehuantepec City. It is not common in winter in northern Vera Cruz, though it has been taken even farther north at Alta Mira, Tamaulipas,[a] February 16, 1895, and a few have been seen in winter at Tampico, Tamaulipas.[b] It is found on the islands off the east coast of Yucatan, the islands of Ruatan and Bonacca, Honduras,[c] and the Swan Islands.[d] It ranges southward to the table-lands of northern Guatemala as far as Coban, but there are no records of its occurrence in southern Guatemala, in Costa Rica, or in South America. The southernmost records are of specimens taken during the winter of 1886–87 on the island of Old Providence off the coast of Nicaragua,[e] and on October 26, 1892, in southeastern Nicaragua.[f] The bird has a wide range through the West Indies. It is abundant in Cuba, occurs throughout the Bahamas and all of the Greater Antilles, and is known from St. Croix, St. Thomas, St. Eustatius, St. Christopher, Guadeloupe, and Barbados of the Lesser Antilles. It winters abundantly in the southern Bahamas, regularly in southern Florida, and irregularly north to central Florida.

Spring migration.—After spending fully five months in its winter home the parula warbler starts on its northward journey. The earliest records of striking at the Sombrero Key lighthouse are March 3 and 7, 1887, March 10 and 11, 1888, and March 3 and 11, 1889. The flights of March, 1887, were light, and those of March, 1888, medium, while that of March 3, 1889, was one of the heaviest ever witnessed at Sombrero Key lighthouse. Many parulas were seen around Perdido lighthouse, northwest Florida, March 22, 1885, and the earliest migrants arrived the previous day at Pensacola, Fla. The average date of arrival for four years at Frogmore, S. C., is March 23, and that for seven years at Raleigh, N. C., April 8.

Other records of average dates of arrival are: Frenchcreek, W. Va., April 22; Washington, April 26; Beaver, Pa., April 30; Germantown, Pa., May 1; Renovo, Pa., May 5; Englewood, N. J., May 4; southeastern New York, May 2; central New York, May 8; central Connecticut, May 6; Boston, May 8; St. Johnsbury, Vt., May 9; southern New Hampshire, May 9; southern Maine, May 10; Quebec, May 14; southern New Brunswick, May 15. The first arrival was noted at Pictou, Nova Scotia, May 23, 1891, and at North River, Prince Edward Island, May 30, 1890. The average of many years' observation in

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[a] Richmond, Proc. U. S. Nat. Mus., XVIII, p. 631, 1896.

[b] Renardo, O. & O., XI, p. 118, 1886.

[c] Salvin, Ibis, p. 247, 1888.

[d] Ridgway, Proc. U. S. Nat. Mus., X, p. 575, 1888.

[e] Cory, Auk, IV, p. 180, 1887.

[f] Richmond, Proc. U. S. Nat. Mus., XVI, p. 484, 1893.

Ontario gives the usual date of arrival as May 6 in southern Ontario, May 10 in the Parry Sound district, and May 13 at Ottawa.

The record of this warbler in the West is very interesting. The dates of first arrivals in spring in Texas are as follows: Vicinity of the lower Rio Grande, March 20, 1877, March 18, 1887, March 13, 1897; Refugio County, March 13, 1899; San Antonio, March 26, 1889, March 18, 1890, March 25, 1891; a few miles northwest of San Antonio, March 20, 1880, March 25, 1900, March 22, 1901; Austin, March 13, 1890, March 18, 1893; Waco, March 10, 1900; Dallas, March 16, 1898, March 17, 1899. Those for Louisiana are of a quite different sort, as is shown by the following table giving dates of first and second arrivals noted and those on which the species became common:

Spring records of parula warbler.

Place and year.	First seen.	Next seen.	Common.
Houma, La., between New Orleans and the Gulf:			
1887	Feb. 28	Feb. 29	Mar. 7
1888	Mar. 7	Mar. 8	Mar. 13
1890	Mar. 12	Mar. 13	Apr. 1
New Orleans:			
1893	Feb. 22	Mar. 10	Mar. 18
1894	Mar. 4	....	Mar. 11
1895	Mar. 9	Mar. 16	Mar. 16
1896	Mar. 3	Mar. 5	Mar. 7
1897	Mar. 5	Mar. 8	Mar. 9
1898	....	....	Mar. 12
1900	Mar. 8	Mar. 9	Mar. 10
1901	Mar. 10	....	Mar. 24
Average	Mar. 5	Mar. 9	Mar. 14

The records show the average date of movement through Florida on the east, Texas on the west, and Louisiana in the center. A comparison of the dates shows, first, that the parula warbler arrives in Texas much later than in either of the other States, and hence does not reach the Mississippi Valley by way of Texas; second, that it arrives in northern Florida at least ten days later than it attains the same latitude in Louisiana. From these two facts it would appear that Louisiana is reached by direct flight across the Gulf of Mexico. The average date of arrival at New Orleans coincides closely with the date when the first migrants arrive at the southern end of Florida. It would seem that the birds of Mexico and Cuba are prompted to move northward at the same time, but the flight over the Gulf of Mexico being so much longer than that from Cuba to Florida, the Mexican birds reach a higher latitude by their initial flight.

The further migration northward in the Mississippi Valley is at a much slower rate. The species consumes an average of twenty-eight days in advancing from New Orleans to Helena, Ark. The later migrants through Florida move more rapidly, and from the latitude of Helena northward the migration in the Mississippi Valley is but five days earlier than in corresponding latitudes on the Atlantic coast.

This slow migration from New Orleans to Helena is noted in several species, and seems to be due to the resting of the birds for several days near the Gulf coast after their long flight.

The average date of arrival at Helena for five years (1896–1901) is April 2, with extremes of March 30, 1896 and 1897, and April 7, 1901. The average date of arrival at St. Louis is April 12, with extremes of April 10, 1887, and April 17, 1885. The average of arrival at Waterloo, Ind., is May 1; Chicago, May 8; Grinnell, Iowa, May 8; Lanesboro, Minn., May 9.

The Texas records are also noteworthy. It is evident that there is no regular progression from south to north. At a moderate rate of speed it would take most species from ten to fifteen days to cross the State, and yet the northern dates are on the whole earlier than the southern. The explanation seems to be that the earlier birds in northern Texas have flown across the Gulf to the upper part of the Texas coast and moved inland from that point instead of crossing the Rio Grande.

The influence of altitude on bird migration is well illustrated by the passing of parulas through Raleigh and Asheville, N. C. The latitude of the two places is the same, but Raleigh is 300 feet above sea level and Asheville 2,000. The records of spring migration at these two points are as follows:

Records of migration of parula warbler in North Carolina.

Place and year.	First seen.	Next seen.	Common.
Raleigh:			
1890	Apr. 3	Apr. 9	Apr. 21
1891	Apr. 13	Apr. 14	Apr. 23
1892	Apr. 4	Apr. 5	Apr. 25
1893	Apr. 5	Apr. 12	Apr. 14
1894	Apr. 6	Apr. 7	....
Average	Apr. 6	Apr. 10	Apr. 21
Asheville:			
1890	Apr. 12	Apr. 13	Apr. 15
1891	Apr. 19	Apr. 20	Apr. 20
1892	Apr. 18	Apr. 19	Apr. 22
1893	Apr. 9	Apr. 10	Apr. 11
1894	Apr. 18	Apr. 19	Apr. 21
Average	Apr. 15	Apr. 16	Apr. 19

As would be expected, the birds appear in the mountains later than on the plains, and it is considered that this is due to the effect of the higher altitude of Asheville. In the following case, however, there is no such effect apparent. The town of Eubank, Ky., is 200 miles north of Helena, Ark., and 85 miles south of St. Louis. It is at an altitude of 1,000 feet and therefore 600 feet higher than St. Louis and 800 feet higher than Helena. The average date of arrival of the parula warbler at Eubank for the eight years 1887 to 1895 is April 9, with extremes of April 4, 1892, and April 14, 1887. This date is three days earlier than the average at St. Louis and seven days later than that at Helena, or, in other words, the dates of arrival at the three places correspond exactly, latitudinal differences considered, showing no effect of the 800 feet difference in altitude. It should be remarked, however, in this connection that there is no height of land between Eubank, Ky., and the Louisiana coast to check or turn the course of migration, while Asheville, N. C., is separated from the coast by a considerable range of mountains.

The parula warbler was found to be abundant in northwestern Yucatan March 17, 1890.[a] It has been found until April on the islands off the coast of Yucatan.[b] It is said to remain in Cuba until April only,[c] but the Florida lighthouse records show that not all individuals leave their winter home until early May. The latest dates of striking at Sombrero Key lighthouse are May 11, 1886, May 4, 8, 9, and 15, 1888, and May 29, 1889.

With this, as with several other species, the few notes on record indicate a later date of migration through the northern Bahamas than at corresponding latitudes in Florida. No parulas were seen in 1890 on Andros Island until March 26;[d] a wave of migrants passed April 18, and in 1898 on a neighboring island the last bird was seen April 30.[e]

Fall migration.—The earliest fall movements of the parula warbler on land can not be noted, for the migrants are not distinguishable from the breeding birds. When, however, the species begins to strike against the lighthouses of southern Florida, it is certainly migrating. It passes through Florida in countless thousands, being second only to the black-throated blue warbler in the frequency with which it strikes the lighthouses. Out of eighty-eight recorded dates of the striking of parulas in fall only eight are earlier than the second week in September, viz: August 9 and 12, 1885, July 28 and 29, and August 21, 1886, and August 22, 23, and 24, 1889. At Key West the first striking of parulas noted occurred on July 30, 1888, and August 4, 1889. By the middle of September the great flights begin and continue in full force for a month. The numbers decrease later, but the birds continue to pass until at least the middle of November. Some late dates are November 5, 8, 10, 12, and 13, 1884; November 12, 1885; November 20, 1887; November 5, 10, and 11, 1888, and November 7, 1891. Gundlach's records in Cuba correspond with the foregoing for he says that this species arrives in August, but in greater numbers in September. It reaches Jamaica early in September, and has been taken about the same time off the coast of Honduras.

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[a] Stone, Proc. Acad. Nat. Sci. Phil., p. 210, 1890.

[b] Salvin, Ibis, p. 247, 1888.

[c] Gundlach, J. f. Orn., p. 411, 1872.

[d] Northrop, Auk, VIII, p. 67, 1891.

[e] Bonhote, Ibis, p. 508, 1899.

Some records of latest birds seen are: Grinnell, Iowa, September 21, 1887; Mackinac Island, Mich., September 2, 1889; Chicago, October 1, 1897; Toronto, September 28, 1898; Ottawa, September 13, 1889; North River, Prince Edward Island, August 25, 1890; St. John, New Brunswick, September 17, 1889; Pittsfield, Me., September 30, 1898; Hartford, Conn., October 20, 1900; southeastern New York, October 12, 1891; Berwyn, Pa., October 31, 1893. The latest recorded southward migrants passed Raleigh, N. C., October 14, 1890, and October 13, 1891, and Asheville, N. C., October 5, 1891. The average of the dates on which the last fall migrant was noted is October 9 at Raleigh and September 29 at Asheville. At Eubank, Ky., the last migrant recorded passed south September 18, 1889, and at New Orleans, October 26, 1899; the average of last dates at New Orleans is October 18.

649. **Compsothlypis pitiayumi nigrilora** (Coues). Sennett Warbler.

The Sennett warbler breeds in Texas along the lower Rio Grande and in Mexico in Coahuila, Nuevo Leon, Tamaulipas, and San Luis Potosi. It winters at least as far north as Nuevo Leon, and has been taken in the last week of February, 1880, on the Rio Grande near Hidalgo.

650. **Dendroica tigrina** (Gmel.). Cape May Warbler.

Breeding range.—A few Cape May warblers breed in the mountains of Jamaica, as attested by specimens in the National Museum, but the rest pass northward through the northern Bahamas, Florida, and eastern United States to their summer home. The species, apart from the singular Jamaican exceptions, is confined strictly to the Canadian life zone, the breeding range extending from northern New England, northern Michigan, and northern Minnesota north to New Brunswick, Nova Scotia, Hudson Bay, and nearly to Great Slave Lake

Winter range.—The Cape May warbler makes its principal winter home in the West Indies, with its center of abundance at Haiti. I has been taken as far north as Rum Cay in the center of the Bahamas and as a rare or accidental winter species at Key West, Fla. Its winter range extends to the islands of Jamaica, St. Croix, St. Thomas Guadeloupe,[a] and Tobago.[b] To the southwest, except for a single individual taken in northern Yucatan[c] and another on the island of Ruatan,[d] the species is unrecorded; and as the general course of migration is southeastward, both of these records are probably unusual

Spring migration.—Some records of spring arrival of the species are as follows: Nassau, Bahamas, March 22, 1890; New Providence

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[a] Lawrence, Proc. U. S. Nat. Mus. VIII, p. 621, 1885.

[b] Sharpe, Cat. Birds Brit. Mus. X, p. 337, 1885.

[c] Boucard, P. Z. S., p. 440, 1883.

[d] Salvin, Ibis, p. 251, 1888.

Bahamas, March 19, 1891; Tortugas, April 8, 1890; Sombrero Key ighthouse, Fla., April 4, 1889; Key West, Fla., April 11, 1887; Puntarasa, Fla., April 16, 1886; Gainesville, Fla., April 14, 1887; Tarpon Springs, Fla., April 17; Daytona, Fla., April 14, 1901; near mouth of Suwanee River, Florida, April 15, 1892. An unusually early individual struck Sombrero Key lighthouse March 3, 1887, a night that witnessed an enormous flight of birds of many kinds for most of whom the flight was one to three weeks earlier than usual. It would seem that these flocks of birds were caught in a storm, driven out of their course, and carried north to Florida. The average of the dates on which the earliest spring migrant was seen in five years at Kirkwood, Ga., was April 26, with extremes of April 20, 1901, and April 30, 1897. At Rising Fawn, Ga., the only bird noted arrived on April 26, 1885. At Asheville, N. C., May 5, 1893, May 7, 1894, and May 5, 1899, represent the first arrivals and show the effect of the alti-ude, as these dates are about simultaneous with the date of usual ppearance of the bird at Washington, 175 miles farther north. The verage date of arrival in southeastern New York is May 12. The first rrival was noted at Montreal May 14, 1890; Quebec, May 16, 1902, nd Scotch Lake, New Brunswick, May 17, 1901. Thus, the Cape May warbler makes an average daily speed of 28 miles from Florida to its breeding grounds. Records of average date of arrival farther west re: Brookville, Ind., May 5; Chicago, May 6; northern Ohio, May 7; outhern Wisconsin, May 11; Ottawa, May 15; Lanesboro, Minn., May 16; and Elk River, Minn., May 20. The first arrival was noted t Aweme, Manitoba, May 14, 1900, and at Medicine Hat, Assiniboia, May 17, 1894.

The western limit of the range of the species can be marked approx-mately by a line drawn from Florida to southern Missouri and up the Mississippi River to Minnesota. There is a single record of occur-ence in Louisiana, probably accidental, and less than half a dozen in he United States west of the Mississippi south of Minnesota.

As already remarked, some Cape May warblers breed in Jamaica, but the bulk of the species leave the southern part of their range by the atter part of March. Some late dates of final departure for the North re: St. Croix, March 16; Haiti, April 6; Andros Island, April 20, 890; Tortugas, April 27, 1890; Cuba, May 2, 1900; Key West, May , 1887, and Asheville, N. C., May 15.

Fall migration.—The average date of appearance of fall migrants at both Chicago and Washington is August 26. Since these places re about 500 miles south of the nesting grounds, it follows that he southernmost breeding birds begin their migration not later than August 10. The earliest recorded date of fall arrival at St. Louis is August 24, 1887; at Asheville, N. C., September 15, 1894; in Chester County, S. C., October 4; at Puntarasa, Fla., October 6, 1886. The species struck the Sombrero Key lighthouse October 7 and 8, 1886 and October 7, 1887. Some very early dates of striking are September 17 and 18, 1887. The heaviest flights noted occurred October 1 and 17, 1887. On these two nights about 50 individuals altogether struck the light, and 6 were killed.

In the latitude of Washington and St. Louis the last fall migrant are seen about October 7-12, and at Key West the latest reporte passed southward November 1, 1887. The latest date of striking a Sombrero Key lighthouse is November 4, 1887. The Fowey Rock lighthouse, on the southeast coast of Florida, in line with migratio to the Bahamas, was struck November 1, 2, and 7, 1891. A belate migrant was shot at Cleveland, Ohio, November 2, 1885.

651. **Dendroica olivacea** (Giraud). Olive Warbler.

The olive warbler breeds in central Mexico and in southern Arizon whence it retires in winter to Mexico where it occurs on the highland from 5,000 to 10,000 feet. It has also been taken in Guatemala fron 6,000 to 10,000 feet. Possibly a few may winter in southern Arizon where one was taken February 21. The arrival of the first was note April 6, 1902, in the Huachuca Mountains, Arizona.

652. **Dendroica æstiva** (Gmel.). Yellow Warbler.

Breeding range.—If a map of the United States and Canada sout of the Barren Grounds was colored to represent the breeding area o the yellow warbler, the uncolored portions would comprise Florida southern Georgia, and numerous small 'islands' representing th upper parts of the eastern mountains and such parts of the wester mountains as are above 6,000-8,000 feet. The summer range of th bird, including the range of the subspecies *sonorana* in the southwestern part of the United States and that of *rubiginosa* in Alaska, cover approximately 40° of latitude—30° to 70°—and 110° of longitude—55 to 165°. The winter range covers 31° of latitude—24° N. to 7° S.— and 54° of longitude—52° to 106°. The two in combination thus giv an extension of 77° of latitude and 113° of longitude.

The extreme points of the yellow warbler's range—northern Alask and western Peru—are farther separated than the extremes of th range of the black-poll warbler, which is considered the greates migrant of the family. Owing, however, to the southerly extensio of the breeding range of the former, it is likely that the longe migration trips of black-polls exceed those made by any yello warblers.

Winter range.—The yellow warbler has been taken in central Per at La Merced[a] (2,600 feet), and at Iquitos[b] in the extreme northeas rn province; in Ecuador at Guayaquil[a] and Esmeraldas[b] on the west oast, and at Archidona[c] and Sarayacu[d] in the central part near the ot of the eastern Andes, also at La Concepcion[e] and Valle del Chota;[e] n northern Brazil on the Rio Tacutu,[f] and in the valley of the Ama- on;[g] in Dutch Guiana;[h] in French Guiana at Cayenne;[i] in British uiana at Georgetown,[j] Bartica Grove,[k] and the River Berbice;[i] in enezuela[l] at Carupano,[m] and on the south side of Lake Valencia;[n] on e island of Trinidad;[o] and at many localities in the valleys of the rinoco and Caura[p] rivers. Most of these places are near the coast nd of little altitude, but the captures in eastern Peru and central cuador show that the species passes far into the interior, though not the greater altitudes. In the State of Colombia, where the bird is mmon in winter, it ranges somewhat higher. It is abundant on the ast at Bonda,[q] and has been taken in the Santa Marta region at inca[r] (2,000 feet) and Santa Marta.[s] It has also been secured in the terior at Bucaramanga[t] (3,000 feet), Ocana[u] (3,700 feet), and Medellin[v] ,000 feet). Specimens occur in many of the Bogota[w] collections, but re not accompanied with information showing the altitudes at which ey were taken. The yellow warbler is one of the commonest species f Central America[x] in winter, and occurs on both coasts and in the terior up to an altitude of 4,000–6,000 feet. It also occurs in winter in

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[a] Berlepsch and Stolzmann, P. Z. S., p. 331, 1896.

[b] Taczanowski, Orn. Per., III, p. 507, 1886.

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[a] Sharpe, Cat. Birds Brit. Mus., X, p. 275, 1885.

[b] Sclater, Cat. Am. Birds, p. 32, 1862.

[c] Goodfellow, Ibis, p. 314, 1901.

[d] Sharpe, Cat. Birds Brit. Mus., X, p. 644, 1885.

[e] Salvadori and Festa, Boll. Mus. Univ. Torino, XV, No. 357, p. 8, 1899.

[f] Pelzeln, Orn. Bras. 71, 1869.

[g] Goeldi, Aves Bras., p. 269, 1894.

[h] Abbott, Proc. Bos. Soc. N. H., I, p. 171, 1844.

[i] Sharpe, Cat. Birds Brit. Mus., X, p. 275, 1885. Sclater, Cat. Am. Birds, p. 32, 1862.

[j] Quelch, Timehri, V, p. 79, 1891; X, p. 261, 1896. Loat, Ibis, p. 566, 1898. loyd, Timehri, XI, p. 228, 1897.

[k] Salvin, Ibis, p. 202, 1885.

[l] Cabanis, Mus. Heine, Pt. I, p. 19, 1850.

[m] Allen, Bull. Am. Mus. Nat. Hist., IV, p. 51, 1892.

[n] Sclater and Salvin, P. Z. S., p. 251, 1869. Ernst, Rev. Cient. Univ. Venez., 1, 33, 1887; Flora & Fauna Venez. 301, 1877.

[o] Chapman, Bull. Am. Mus. Nat. Hist., VI, p. 24, 1894. Salvin, Cat. Strick. Coll. 91, 1882.

[p] Berlepsch & Hartert, Nov. Zool., IX, p. 9, 1902.

[q] Allen, Bull. Am. Mus. Nat. Hist., XIII, p. 177, 1900; Auk, XVII, p. 366, 1900.

[r] Salvin and Godman, Ibis, p. 117, 1880.

[s] Bangs, Proc. Biol. Soc. Wash., XII, p. 143, 1898.

[t] Berlepsch, J. f. Orn., p. 282, 1884.

[u] Wyatt, Ibis, p. 322, 1871.

[v] Sclater and Salvin, P. Z. S., p. 494, 1879.

[w] Sclater, P. Z. S., p. 143, 1855.

[x] Richmond, Proc. U. S. Nat. Mus., XVI, p. 484, 1893. Nutting, ibid., VI, p. 382, 83. Underwood, Ibis, p. 433, 1896. Cherrie, Auk, VII, p. 335, 1890.

Yucatan (though much more commonly in spring migration), and also in Chiapas. During the spring migration it is common on the coast of Tabasco and Vera Cruz. The western extension of its winter range in Mexico can not be determined from present records and material, as these are insufficient to distinguish *æstiva* from the various subspecies it meets in Mexico—*rubiginosa* from Alaska, *sonorana* from Arizona, and the local race, *dugesi*, from Guanajuato and the central plateau region.

There is a single record of the capture of the yellow warbler on the island of Grenada[a] November 14, 1882. This is the only certain record of the occurrence of the bird in the West Indies, where closely allied resident species occupy its favorite localities. This division of districts between the resident and the migrant species is especially noticeable on the north coast of Honduras, where *D. æstiva* occurs on Ruatan Island[b] and on the mainland at Truxillo,[c] but seems not to visit the neighboring island of Bonacca, which is occupied by *D. bryanti.*

Spring migration.—The yellow warbler is not an early spring migrant, and is one of the most irregular of the family in its movements. There is no record of the bird in spring in Florida. It arrives in Alabama, Georgia, and South Carolina no earlier than in North Carolina, as is shown by the following dates of earliest spring records Coosada, Ala., April 26, 1878; Greensboro, Ala., April 14, 1888 Shelby, Ala., April 25, 1898; Darien, Ga., April 28, 1890; Savannah Ga., April 16, 1894; Kirkwood, Ga., April 23, 1899, April 10, 1900 April 17, 1901; Frogmore, S. C., April 17, 1885. The average date of arrival at Raleigh, N. C., for eight years was April 12, and the earliest date April 5, 1888. At Asheville, N. C., in the mountains the average date was about three days later than at Raleigh. Quite voluminous records show that yellow warblers arrive on the average at Newmarket, Va., April 22; Washington, April 20; Beaver, Pa. April 23; Renovo, Pa., April 30; Englewood, N. J., and southeastern New York, May 1; central Connecticut, Providence, R. I. and Boston, May 4; Randolph, Vt., May 9; southern New Hampshire May 10; southern Maine, May 11; Montreal, May 10; Quebec, May 15; St. John, New Brunswick, May 24; Chatham, New Brunswick May 28; Pictou, Nova Scotia, May 14; Halifax, Nova Scotia, May 14 North River, Prince Edward Island, May 25; Hamilton River, Quebec May 31.

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[a] Wells, Proc. U. S. Nat. Mus., IX, p. 611, 1886 (*D. petechia*=*D. æstiva*).

[b] Salvin, Ibis, p. 247, 1888.

[c] Ridgway, Proc. U. S. Nat. Mus., X, p. 579, 1888.

Records from the Mississippi Valley are given in tabular form:

Mississippi Valley records of arrival of yellow warbler.

Year.	New Orleans and vicinity.	Helena, Ark.	Eubank, Ky.	St. Louis, Mo.	Onaga, Kans.
1884	....	....	....	Apr. 19	....
1885	Apr. 9	....	....	Apr. 18	....
1886	Apr. 12	....	....	Apr. 19	....
1887	....	....	....	Apr. 20	....
1888	Apr. 2	....	....	Apr. 15	....
1889	Apr. 6	....	Apr. 12	....	....
1890	Apr. 5	....	Apr. 14	....	....
1891	....	....	Apr. 15	....	Apr. 26
1892	Apr. 1	....	Apr. 18	....	Apr. 28
1894	....	....	Apr. 17	....	Apr. 26
1895	Apr. 6	Apr. 21	Apr. 20	....	Apr. 26
1896	Apr. 4	....	....	....	Apr. 23
1897	....	Apr. 18	....	....	Apr. 24
1898	Apr. 2	....	....	....	Apr. 29
1899	Apr. 3	Apr. 16	....	....	....
1900	Apr. 8	Apr. 23	....	....	Apr. 22
1901	Apr. 9	Apr. 14	....	....	Apr. 25
Average	Apr. 6	Apr. 18	Apr. 16	Apr. 18	Apr. 25

Records of average date of arrival farther north are: Brookville, nd., April 15; Waterloo, Ind., April 25; Wauseon, Ohio, April 26; leveland, Ohio, April 28; southern Ontario, May 1; Ottawa, May 7; etersburg, Mich., April 26; Chicago, May 2; southern Wisconsin, lay 6; Keokuk, Iowa, April 30; Grinnell, Iowa, May 1; Lanesboro, linn., May 7; Aweme, Manitoba, May 14. The birds of the Rocky lountains arrive considerably later than at corresponding latitudes in he East. Arrival in Colorado is principally during the second week f May; at Cheyenne, Wyo., on May 11; Terry and Great Falls, lont., May 16. Other records in the far North are: Osler, Saskatchevan, May 17, 1893; Red Deer, Alberta, May 16, 1893; Pelican Rapids, thabasca, May 18, 1903; near Lake Athabasca, May 17, 1901; Fort hippewyan, May 24, 1893; Fort Simpson, May 26, 1861, and May 1, 1904.

The records of arrival of the yellow warbler in Texas are important s bearing on the general problem of migration routes in the State, nd are as follows: Corpus Christi, April 22, 1891; Refugio County, pril 17, 1899; San Antonio, April 15, 1890, and April 16, 1891; ustin, April 16, 1893; Dallas, April 12, 1898, and April 15, 1899; onham, April 9, 1885, April 10, 1886, April 8, 1887, April 8, 1889, pril 14, 1890, and April 15, 1891, and Gainesville April 18, 1886, nd April 13, 1889.

Some late spring records south of the United States are as follows: entral Ecuador, common in April; Costa Rica, May 1; Vera Cruz, lay 6–10, 1894; Cozumel Island, April 18, 1901.

Fall migration.—The striking characteristic of the records of the all migration of the yellow warbler is their earliness. Along the eastern line of migration southward migrants have been noted in central Florida July 20, and by the last week in July the birds are in full tide of migration at New Orleans. Fall migrants have been recorded at the following places on the dates named: Key West, July 26, 1889; southeastern Nicaragua, August 9, 1892; San José, Costa Rica, August 25, 1889, and August 24, 1890; Bonda, Colombia, August 27, 1898.

Cherrie says of yellow warblers migrating through Costa Rica:

> They made their first appearance in the fall of 1889, August 25, on which date a number were seen. Those taken were very fat. From this date they were common, and by September 17 abundant. Then the numbers seem to have diminished, until during October, November, December, and January they were only tolerably common. During the latter part of January and the first of February they were the most common warbler in the vicinity of San José. From this time they were common until the first of May. None of those taken last showed any signs of breeding.[a]

The bulk of the birds pass southward soon after the early migrants. Following are some of the records of last-noted migrants: Near latitude 64° north of Fort Rae, Mackenzie, August 10, 1903; Great Falls, Mont., September 13, 1889; Lanesboro, Minn., September 10, 1889; Ottawa, September 7, 1901; North River, Prince Edward Island, August 20, 1889; St. John, New Brunswick, September 2, 1890; Montreal, September 3, 1890; Lewiston, Me., September 5, 1898; Providence, R. I., September 4, 1901; Englewood, N. J., September 1, 1886; Germantown, Pa., September 24, 1887; Washington, September 28, 1890; Raleigh, N. C., August 28, 1888; Asheville, N. C., September 1, 1890; Frogmore, S. C., September 28, 1886; Grinnell, Iowa, August 24, 1887; Chicago, September 6, 1899; St. Louis, September 3, 1896; Onaga, Kans., August 24, 1894; Bonham, Tex., September 12, 1889; New Orleans, October 27, 1893.

Though in migration the yellow warbler occurs in Florida as far south as Key West and is sometimes fairly common in northern Florida, the numbers that migrate through the southern part of the State must be very small, for not a bird passing north or south has been reported from any of the Florida lighthouses. The migration route of the yellow warblers that breed near the Atlantic coast is evidently southwest to northern Georgia and Alabama, and then across the Gulf of Mexico.

652a. Dendroica æstiva sonorana Brewst. Sonora Yellow Warbler.

This southwestern subspecies of the yellow warbler nests in northwestern Mexico, southern Arizona, southern New Mexico, and western Texas, and extends its breeding range northward until it meets the eastern form approximately in central New Mexico. It retires to Mexico and Guatemala for the winter, but its range in these countries has not yet been satisfactorily determined.

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[a] Cherrie, Auk, VII, 335, 1890.

352b. Dendroica æstiva rubiginosa (Pall.). Alaska Yellow Warbler.

The breeding yellow warblers of British Columbia and Alaska have been segregated under this name. They migrate through California and winter in Mexico, but the records of their movements can not be separated from those of the allied varieties inhabiting these districts.

353. Dendroica bryanti castaneiceps Ridgw. Mangrove Warbler.

The mangrove warbler is not found in the United States, but occurs in western Mexico and Lower California, where it may be found both in winter and summer.

354. Dendroica cærulescens (Gmel.). Black-throated Blue Warbler.
354a. Dendroica cærulescens cairnsi Coues. Cairns Warbler.

The Cairns warbler breeds in the Alleghenies from Virginia (rarely Pennsylvania) southward to northern Georgia. In North Carolina it nests commonly at 3,000 to 4,500 feet above sea level, and in fall migration individuals have been seen at 6,400 feet elevation.

The records of migration and wintering of the black-throated blue warbler make no distinction between the two forms, *cærulescens* and *cairnsi;* hence in the following accounts of winter range and spring and fall migration the two forms are treated as one.

Breeding range.—The breeding range of *cærulescens* extends from Newfoundland and northeastern Quebec through northern New England and south in mountainous country to Pennsylvania. The bird breeds rather commonly in the vicinity of Montreal, and not uncommonly westward to Michigan and northern Minnesota, in which State it is found as far west as the forests extend.

Migration range.—To the southward it is scarcely found west of the Mississippi River, though it has been several times recorded in Iowa and Missouri. Accidental occurrences have been noted at Lincoln, Nebr., in Finney County, Kans., at Denver, Colo., and at Rio Mimbres and Rio Grande, N. Mex. The southwestern limit of the regular range of the species is probably the mouth of the Mississippi River.

Winter range.—The black-throated blue warbler occurs in winter in the United States at Key West, Fla., where it is sometimes not uncommon. At this season it is the most abundant of North American birds in Cuba, and is equally common in Haiti. In Jamaica it is less common, and in the Bahamas rare, though very abundant in the latter islands during the spring migration. While very abundant on the south coast of Cuba, it is rare farther south, though it has been taken at Little Cayman,[a] Swan Islands,[b] and Cozumel.[c] The sole record of its occurrence in Central America is that of a specimen from Coban,[a] Guatemala (4,300 feet altitude); and the only record of its capture in South America is that of an adult male taken in the Santa Marta district at Las Nubes,[b] Colombia (5,000 feet). The winter home of the black-throated blue warbler is better defined than that of any other common warbler, and allows a very exact determination of the square miles of territory occupied by it at this season. Cuba, Haiti, and Jamaica, with a combined area of 74,000 square miles, are doubtless occupied during the winter by the great majority of the individuals of the species. The remaining birds do not probably cover enough territory to bring the total to 80,000 square miles. This is a small area compared with that occupied during the breeding season, and is about equal to that part of the summer range of the bird which extends along the Atlantic slope in the United States.

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[a] Cory, Auk, VI, p. 31, 1889.

[b] Ridgway, Proc. U. S. Nat. Mus., X, p. 575, 1888.

[c] Ridgway, Proc. U. S. Nat. Mus., VIII, p. 564, 1885.

Spring migration.—Outside the lighthouse records, there are almost no spring records of the black-throated blue warbler in Florida, but a full set of data from North Carolina allows a calculation of the approximate time when the species crosses from Cuba to Florida. The average of the earliest spring arrivals noted for eleven years at Raleigh, N. C., is April 27, with extremes of April 23, 1892, and May 2, 1893, in normal migration; in 1888 and 1894 stragglers were seen somewhat earlier. At Asheville, N. C., 2,000 feet above sea level, the average for four years was April 22, with extremes of April 19, 1893 and April 26, 1890. The species is one of the few that appear in the mountains earlier than on the plains, and the case seems to sustain the theory that the individuals of a species that breed farthest south are the first to migrate in the spring; hence the inference that the arrivals noted at Asheville were those of birds about to breed in the vicinity, while those at Raleigh were of birds proceeding to more northern breeding grounds.

It is about 800 miles nearly due north from Sombrero Key, Florida, to Asheville, N. C. Few species of birds migrate in the spring faster than 25 miles per day. At this rate it would require a whole month for the journey of a bird from southern Florida to North Carolina. With the North Carolina dates in mind, we should therefore expect the black-throated blue warblers to be striking the Sombrero Key light in the latter part of March. But as a matter of fact the birds appear there scarcely earlier than in North Carolina. A single bird struck the lighthouse March 9, 1886, and three others March 21, 1886. With these exceptions, the earliest dates are April 15, 1885, April 11, 1886, April 19, 1887, and April 14, 1888. This absence of earlier records is not due to lack of weather conditions favorable for striking, for in the spring of 1887, between March 3 and April 13, the

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[a] Salvin, Ibis, p. 205, 1866; Sharpe, Cat. Birds Brit. Mus., X, p. 351, 1885.

[b] Allen, Bull. Am. Mus. Nat. Hist., XIII, p. 177, 1900; Auk, XVII, 367, 1900.

Sombrero Key light was struck by birds on eleven nights. Thirteen species of warblers were noted among the birds killed, but none of these were *cærulescens*. The latter species, however, was taken in four out of the next five flights. The evidence was just as strong the next season. This species was not taken during the first six flights of March and early April, but after April 14, when the bird was first observed among those striking the light, it was included in every large flight of the ensuing month. This seems to show that the species does not normally begin its migration much before the middle of April, and furthermore that some individuals may make the journey from Cuba to the southern Allegheny Mountains at a single flight.

The latest date on which a north-bound migrant was noted at Raleigh, N. C., in the eleven years from 1890 to 1900 was May 16, and the average of the dates on which the latest migrant passed was May 11. There is an apparent discrepancy between these Raleigh dates and the dates on which the birds are recorded as passing the southern Florida lighthouses. As previously shown, the journey from the lighthouses to North Carolina should occupy a month, yet black-throated blue warblers struck the lights in May for five consecutive years, and in 1889 as late as May 29. On May 8, 1888, 41 birds struck the lights and on May 12, 18; 17 birds struck one of the lighthouses near St. Augustine May 14, 1884, and dead birds were picked up at Alligator Reef lighthouse May 21, 1885, and May 11, 1888. North of Raleigh the average date of arrival at Frenchcreek, W. Va., is April 29; Washington, D. C., and Renovo, Pa., May 3; Philadelphia and southeastern New York, May 6; northeastern New York, May 9; central Massachusetts, May 8; Boston, May 10; St. Johnsbury, Vt., May 9; southern Maine, May 14; Quebec, May 11; central New Brunswick, May 16.

In southern Louisiana and southern Mississippi the black-throated blue warbler is almost unknown. In eight years' collecting in this region three good ornithologists saw but two individuals of the species. In northwestern Mississippi, however, at Shell Mound, three birds were seen on April 7, 1892, and the species was common the next day. At New Orleans spring migrants were recorded on March 22, 1894, and March 26, 1897. These dates are in advance of those of the ordinary migration to southern Florida, and undoubtedly represent a movement directly across the Gulf of Mexico.

Migration west of the Alleghenies corresponds almost exactly in time with that at corresponding latitudes along the Atlantic slope, as evidenced by the following records of average date of arrival: Brookville, Ind, April 30; Waterloo, Ind., May 5; northern Ohio, Chicago, and southern Michigan, May 7; Milwaukee, Wis., May 9; southern Ontario, May 8; Parry Sound district, Ontario, May 10; Ottawa, May 11.

Fall migration.—The black-throated blue warbler has one of the simplest of fall migration routes. The individuals breeding in New England and to the northward follow the Coast States to Florida and cross to the West Indies, while those from the interior migrate south and slightly southeast to join the eastern birds. First migrants are noted on the average at Chicago, September 1, the earliest date being August 25, 1898. Near Philadelphia the average for six years is September 13, and the earliest date September 8, 1898. The earliest migrant at Washington was noted August 21, 1887. Records of average date of last birds seen are: Ottawa, September 29; Chicago, October 1; Renovo, Pa., October 6, and Frenchcreek, W. Va., October 9. Some latest records are: Ottawa, October 7, 1900; Chicago, October 10, 1897; Petitcodiac, New Brunswick, September 5, 1886; Montreal, September 24, 1887; Lewiston, Me., October 3, 1897; Renovo, Pa., October 11, 1897; Washington, October 14, 1888; Frenchcreek, W. Va., and Asheville, N. C., October 15, 1890. The first of the species to reach southern Florida usually arrive early in September, though few individuals are noted before the middle of the month, following which they come in clouds. At the lighthouses large flights are observed every few days from September 13 to November 18. Omitting an accidental occurrence on July 28, the extremes of fall migration at the lighthouses are from September 3 to November 30, or nearly a third of the entire year. In 1888 black-throated blue warblers were quite common from August 5 to November 10 at St. Lucie, on the east coast of Florida. At Raleigh, N. C., most of the fall migrants are seen between October 4 and October 19; and, omitting a single stray bird noted November 19, 1885, the extreme dates are September 11 and October 24. Thus the first birds appear at Raleigh just about the time the heaviest flights are passing Sombrero Key.

Black-throated blue warblers strike the lighthouse at Sombrero Key in greater numbers than any other kind of bird, particularly during the fall migration. Although they were observed to strike the light in spring on twenty-five different nights in the course of five years, the total of their numbers (122) was not large. But in the fall their aggregate is very great. In five years' time they struck the light on seventy-seven nights, and as a result 450 dead birds were picked up on the platform under the lantern. Probably a still larger number fell into the sea. Adding to these those that were merely stunned and that remained on the balcony under the light until able to resume their journey, the keeper counted 2,000 birds that struck. There were two nights, however, when the numbers of this species were so great that no attempt was made to count them. The Fowey Rocks lighthouse was struck on thirty different nights. It is certain, therefore, that the black-throated blue warbler passes in enormous numbers along both coasts of southern Florida. Yet judging by the statements of local observers, the species is rare from central Florida to the southern Alleghenies. At Puntarasa, a third of the way up the west coast of Florida, Atkins considers it common in fall and rare in spring; a little farther north at Tarpon Springs, according to Scott, it is rare in spring and absent in the fall; at Gainesville, Fla., Chapman saw but six individuals in the entire spring of 1887; and at Palatka, Fla., Hasbrouck saw none. North of Florida three good observers in Alabama and two in Georgia do not report the species. In five years' collecting in South Carolina it was not noted by Hoxie, and only four out of nine observers in North Carolina report its occurrence.

655. Dendroica coronata (Linn.). Myrtle Warbler.

Breeding range.—The myrtle warbler breeds generally in Labrador, Newfoundland, Quebec, Ontario, New Brunswick, Nova Scotia, and northern New England, and locally in southern Maine, reaching there its southernmost breeding ground at ocean level. It breeds commonly in the mountains of New Hampshire and Vermont and in the Adirondacks, less commonly in the Catskills and the elevated portions of Massachusetts, and is rare or accidental in summer at Utica and Buffalo, N. Y. The regular breeding range extends westward from the Adirondacks along the north shore of Lake Huron to the northern peninsula of Michigan and the hill district of northeastern Minnesota. It has been found breeding from Manitoba to central Keewatin and through the Northwest Territories, British Columbia, and Alaska, to the shores of the Arctic Ocean. There is one record of the species breeding on the island of Jamaica. A female in worn plumage taken at Key West,[a] July 28, 1888, may have nested in a southern latitude. A specimen (young of the year) taken at Ciudad Durango, Mexico, July 27,[b] was moulting into the first autumn plumage.

Winter range.—The myrtle warbler is the hardiest of the warblers of the United States, and spends the cold season as far north as southeastern Kansas, southern Illinois, southern Indiana, and southern New England. It winters regularly and commonly in North Carolina, even at an altitude of 2,000 feet, and along the coast and a few miles inland it occurs with more or less frequency as far north as Massachusetts, and even to Cape Elizabeth, Me. At Worcester, Mass., in the central part of the State, it winters regularly but sparingly. Although the winter and summer homes of the species in Massachusetts are thus not widely separated, it is not to be supposed that the winter birds are the same individuals that breed in the elevated parts of the State; these latter doubtless have passed south.

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[a] Scott, Auk, V, p. 430, 1888.

[b] Sharpe, Cat. Birds Brit. Mus., X, p. 314, 1885.

The myrtle bird is found in winter throughout the Bahamas, and i a common winter resident of Cuba, Haiti, Jamaica, and Porto Rico It also includes in its winter range eastern Texas and eastern Mexico where it is one of the commonest winter birds from the coas to 3,000 feet and is less common 1,000 feet higher. It ranges wes rarely to Guanajuato[a] and reaches the Pacific Ocean at the Isthmus o Tehuantepec. It is not uncommon in Yucatan[b] and is generally distributed in Guatemala up to an elevation of 5,000–6,000 feet. Farthe east it is not common, though it has been taken at Belize, Britis Honduras, San Pedro, Honduras, and on the islands off the coasts o Yucatan[c] and Honduras.[d] The species has been found in easter Nicaragua[e] from November 28 to February 16, has been taken in Cost Rica in the Angostura Mountains and twice at San José,[f] and has bee recorded twice in Panama—at Lion Hill near the north coast and a Chiriqui in the mountains on the Pacific slope. It has not yet bee reported from the mainland of South America. The foregoing record show that the winter distribution of the species in Mexico and Centra America is not such as would be anticipated of a bird so strictly borea in its breeding habits. In general it occupies the coasts and the lowe plateaus, while the sides of the mountains, where it would be expecte to occur, are occupied by its western relative, the Audubon warbler

Spring migration.—The myrtle warbler is one of the first migrant to move northward. A large flight struck the Alligator Reef lighthouse February 23, 1892, and some 60 birds struck the Sombrero Ke lighthouse March 3, 1889. By the middle of March migration is wel under way over all the winter range, and the foremost birds kee close behind the disappearance of frost. A strange state of affair appears in connection with the migration of the myrtle warbler in th district just north of the ordinary winter range. The bird is wel known, and the records are so numerous that the usual dates of arriva can be ascertained with much accuracy. Four towns in Pennsylvania varying in altitude from Philadelphia at sea level to Renovo at abou 1,000 feet, report average dates of arrival ranging from April 27 t April 30. Directly north in the western half of New York the average date of arrival varies from May 1 to May 3, and the same date will cover the usual time when the first birds appear in northwester Ohio. In southeastern New York the average date of arrival is Apri 25; at Boston, April 22; in southern New Hampshire and souther Maine, April 23; at St. John, New Brunswick (average of eleve years of observation), April 23, and in the Province of New Bruns wick (average of nine years' records in various places), April 24. Thus the first myrtle warblers are noted in New Brunswick about a week before they are seen in Pennsylvania and New Jersey, some 600 miles to the southwest. The average dates of arrival in southern Ontario are a few days earlier than in the portions of New York, Pennsylvania, and Ohio lying directly to the south. Around Lake Michigan stretches another district of early spring appearance. The average date of arrival at Chicago and Rockford, Ill., is April 16; Milwaukee, Wis., April 18, and Grand Rapids, Mich., April 16. The same anomalous state of affairs found along the Atlantic coast appears on the Mississippi River. At four towns in southeastern Iowa the average date of arrival, aggregating twenty-seven years of observation, is April 19; while the average date for nine years at Lanesboro, Minn., and for seven years at Elk River, Minn., is in each case April 6. Thus the myrtle warbler appears three days earlier at Elk River han in the district 300 miles farther down the river.

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[a] Dugès, La Nat., I, p. 140, 1870.

[b] Stone, Proc. Acad. Nat. Sci. Phil., p. 210, 1890; Boucard, P. Z. S., p. 440, 1883.

[c] Salvin, Ibis, p. 248, 1888.

[d] Ridgway, Proc. U. S. Nat. Mus., X, p. 575, 1888.

[e] Richmond, Proc. U. S. Nat. Mus., XVI, p. 484, 1893.

[f] Cherrie, Auk, VIII, p. 278, 1891.

Outside of the districts of apparently irregular movement the first myrtle warblers appear on the average at Pictou, Nova Scotia, April 30; Halifax, Nova Scotia, May 2, and North River, Prince Edward Island, April 26. The arrival of the myrtle warbler at North River is therefore one day earlier than at Beaver, Pa., while in the case of 11 other warblers the average arrival is thirteen days later. Southern Michigan is reached on the average April 25, southern Ontario April 9, and Ottawa May 2. The migrants up the Mississippi Valley pass nto southern Manitoba April 23, and have been noted at Osler, Sas-atchewan, May 4, 1893; Edmonton, Alberta, May 8, 1903; near Atha-asca Landing, May 4, 1901; Fort Simpson, Mackenzie, May 16, 1861, nd May 7, 1904; and Fort Good Hope, Mackenzie, May 25. The western birds arrive in southern British Columbia April 15; at Fort Reliance on the upper Yukon, May 5, and at the mouth of the Yukon, May 18. In 1899 the first were noted on the Kowak River in northwestern Alaska, May 22.

By the last of March all the myrtle warblers have departed from amaica, Haiti, Cuba, and the Bahamas. The latest recorded date f striking of this species at any of the Florida lighthouses is April , 1889. By the middle of the month the latest northbound birds ave left southern Florida. For six years the average date on which he latest birds passed Raleigh, N. C., was May 6. Directly west of aleigh, at Asheville 2,000 feet up in the mountains, the latest igrants seen in the spring were noted on April 25, 1890; April 30, 894; May 18, 1893, and May 18, 1899. In six years' time at New rleans the average date of departure of the latest myrtle warbler was pril 22, with variations from April 21 to April 27. Most of the igrants cross the Rio Grande into Texas about the middle of March, nd it is the middle of April before the last have passed north.

Fall migration.—As would be expected from its northern breedin
range, the myrtle warbler is a late fall migrant. It usually reache
Englewood, N. J., September 26; Philadelphia, September 27, an
Washington, October 1. At Raleigh, N. C., the average date of i
arrival for twelve years is October 16, with extremes of October 1
1886, and October 21, 1885. Not many myrtle warblers reach Florid
before November, and they are the last migrants to arrive in Cub
In 1887 none of the species struck at Sombrero Key lighthouse unt
November 11, but the next fall they began striking October 3, an
were noted also on October 4, 9, and 29, November 4, 10, and 11, an
December 1. The first migrants reach northwestern Minnesota abou
September 8; Lanesboro, Minn., September 22; southern Wisconsi
September 25; Chicago, September 27; Waterloo, Ind., October
and St. Louis the first week in October. The average date of fa
arrivals for seven years in the vicinity of New Orleans is October 1
with extremes of October 12, 1895 and 1897, and October 31, 189
This is a little earlier than in corresponding latitudes along t
Atlantic coast. The myrtle warblers desert the northern part of the
breeding range by the last of August or early in September, but the
southward retreat is so slow that many are still north of the Unit
States until well into October. The last fall migrant was seen Augu
24, 1903, at latitude 65° near Great Bear Lake; and almost two mont
later, on October 15, a straggler was seen near latitude 62° on t
Mackenzie River. Records of the average date of the last seen ar
Aweme, Manitoba, and Parry Sound district, Ontario, October 1
Ottawa, October 23; southern Ontario, October 24; Quebec and Nor
River, Prince Edward Island, October 8; St. John, New Brunswic
October 23. The dates are not much later in the northern Unit
States, where the species has been noted on the average at Lanesbor
Minn., until October 22; Grinnell, Iowa, October 28; Chicago, Oct
ber 23; southern Maine, October 17; central Massachusetts, Octob
19; central Connecticut, October 26; southeastern New York, Nove
ber 12; Philadelphia, November 9.

656. Dendroica auduboni (Towns.). Audubon Warbler.

Breeding range.—The Audubon warbler replaces the myrtle warbl
from the Rocky Mountains to the Pacific. It breeds north to Briti
Columbia, Alberta (Calgary), Montana, and the Black Hills of Sou
Dakota, south to southern California, northern Arizona, and N
Mexico, and east to Colorado and western Nebraska. It has occurr
accidentally in Pennsylvania and Massachusetts. It nests to an altitu
of 11,000 feet.

Winter range.—While to the eastward the Audubon warbler scarce
winters north to the Rio Grande, yet on the Pacific slope it is fou
at this season in most of the valleys of California, and a few spe

the winter in southern Oregon. The winter range extends over most of Mexico to Guatemala; the species is most abundant in western Mexico and the higher districts of the eastern and southern parts.

Spring migration.—As would be expected from the winter range of the Audubon warbler, the dates of spring arrival are very different in the eastern and western portions of its habitat, respectively. In southern Arizona and southern New Mexico the first birds arrive in March, advance to northern Colorado by the third week in April, and reach the Black Hills in the first week of May. Passing northwestward, the average dates of arrival are April 29 at Great Falls, Mont.; April 23 at Columbia Falls, Mont.; and March 20 in southern British Columbia. On the plains of eastern Colorado and western Kansas, where the species is known only as a migrant, the dates are all late—from April 29 to May 27.

Fall migration.—In August the mountain breeding birds begin to descend to lower altitudes, and during September reappear on the plains. The earliest migrants move south of the breeding range in the last week of September and enter Mexico soon after the 1st of October. The northern part of the range in Montana is deserted about the 10th of October.

656a. **Dendroica auduboni nigrifrons** Brewster. Black-fronted Warbler.

Breeds in the mountains of northwestern Mexico and north to the mountains of southern Arizona. The winter range has not yet been determined, but the parties of the Biological Survey have taken the bird in fall migration at 6,000 feet in Durango. The arrival of the first migrant was noted May 9, 1902, in the Huachuca Mountains, Arizona, and an exceptionally early migrant was seen April 5, 1903.

657. **Dendroica maculosa** (Gmel.). Magnolia Warbler.

Breeding range.—One of the best examples of a species limited during the breeding season to the Canadian zone is the magnolia warbl k, Its breeding range is from the higher parts of Massachusetts, nort all New York, northern Michigan, northern Minnesota, and sout ier is Assiniboia (Wood Mountain) to Newfoundland, northern Quebec, ms Hudson Bay, Lesser Slave Lake, Fort Simpson, and the Nahanni Mountains. It is rare or casual in British Columbia. It breeds not uncommonly near the summits of the Allegheny Mountains of eastern Pennsylvania, in a region that in the higher portions probably furnishes Canadian conditions. The same is probably true of its southernmost breeding home in western Maryland where it nests on the highest mountains.

Winter range.—The winter distribution of the magnolia warbler is about as extensive as the breeding area, but while in the summer the species is a bird of the Canadian life zone, in winter it is an inhabitant of the hot coastal region of Mexico and Central America. Its winter home in Mexico extends from northeastern Puebla and central Vera Cruz to the Pacific coast of eastern Oaxaca and eastward to Tabasco and Chiapas. It is fairly common in the lower parts of this district and less common in the higher. The highest altitude at which it has been noted in winter is about 3,000 feet, although in spring migration a few individuals have been seen at Orizaba, Vera Cruz, at 4,000 feet elevation. In Guatemala the species is found on the lowlands of the Pacific coast and to an altitude of 5,000 feet throughout much of the country as far north as Vera Paz. It has been noted at the following points on the Atlantic coast of Mexico and Central America: Northeastern Yucatan (common in spring migration); Cozumel Island, eastern Yucatan (January); Belize, British Honduras; Ruatan Island (common), and Truxillo, Honduras; coast of southeastern Nicaragua (quite common) Costa Rica (one record); and Panama (not infrequent on the north coast). It is recorded from Lake Nicaragua, where it is rare.

The Bahamas and Cuba are commonly included in the winter range of the magnolia warbler, but there is no positive record of the occurrence of the bird in winter in either. The statements of Bryant that in New Providence,[a] Bahamas, the magnolia warbler was "as abundant as in the United States," and that "a few were seen as early as the 15th of March," are certainly questionable. Six specimens were taken on Watlings Island,[b] Bahamas, October 6–21, 1891, probably in fal migration. The island of Eleuthera,[c] Bahamas, is given by Cory as one of the places where the species has occurred, but no authority is cited in support of the statement. The species was once seen in Apri in Cuba,[d] and once in December in Haiti,[e] and there are strange records of capture in Porto Rico[f] September 26, 1899, and December 26, 1900 All these West Indian records probably refer to wandering birds Similar wanderings have been noted farther north. The bird has been taken a few times at the eastern base of the Rocky Mountains nine times in California, and twice in British Columbia.

Spring migration.—The dates of arrival of the magnolia warbler in spring furnish the best evidence yet available in support of the theory that birds migrating across the Gulf of Mexico do not always aligh as soon as they reach the shore. The species is a common spring migrant from the Mississippi River to the Atlantic, between latitudes 37° and 39°. South of this district it becomes less and less common except in the mountains, until in the Gulf States it is rare. (In the fall it is common in the Gulf and South Atlantic States to northern Georgia.) In spring migration it appears at nearly the same time throughout the region extending from Lake Michigan and Chesapeake Bay south to the Gulf of Mexico, as is shown by the following records of earliest appearance in spring: Key West, Fla., April 27, 1889; Kirkwood, Ga., April 26, 1898, April 20, 1900, April 29, 1902; Rising Fawn, Ga., May 1, 1885; Chester County, S. C. (general summary of fourteen years' observation), "first two weeks of May;" Asheville, N. C., May 8, 1890, May 7, 1899; Raleigh, N. C., May 11, 1885, May 10, 1889; Shelby, Ala., May 4, 1898; New Orleans, May 2, 1895, May 5, 1897, April 26, 1903; Rodney, Miss., May 3, 1889; Helena, Ark., May 3, 1896, May 8, 1898; Acton, Ky., May 4, 1901; Lexington, Ky., May 1, 1899; Pierce City, Mo., May 2, 1885; St. Louis, May 3, 1882, May 3, 1883, May 5, 1884, May 4, 1885, May 4, 1886, May 5, 1887, May 5, 1888. Averages of date of arrival for several years are: April 30 at Washington (earliest date April 22, 1891); May 5, at Beaver, Pa., and May 6, at Chicago (earliest date May 1, 1895). North of this district the migration is fairly uniform though rapid, the first magnolias being seen on the average at Renovo, Pa., May 7; in central Massachusetts, May 11; St. John, New Brunswick, May 16; Montreal, May 20; Godbout, Quebec, May 22, and North River, Prince Edward Island, May 26. West of the Alleghenies the average date of arrival in northern Ohio is May 8; southern Ontario, May 11; Ottawa, May 13; southern Michigan, May 11; southern Wisconsin, May 10; Lanesboro, Minn., May 9; Aweme, Manitoba, May 16. The first arrival was seen at Qu'Appelle, Assiniboia May 18, 1899; Grand Rapids, Athabasca, May 22, 1903; Fort Chippewyan, Athabasca, May 23, 1901, and Fort Simpson, Mackenzie, May 23, 1860, and May 31, 1904.

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[a] Bryant, Proc. Bost. Soc. Nat. Hist., VII, p. 110, 1859.

[b] Cory, Auk, IX, p. 49, 1892.

[c] Cory, Cat. Birds W. I., p. 118, 1892.

[d] Gundlach, Anal. Soc. Esp. Hist. Nat., VII, p. 183, 1878.

[e] Cory, Birds Haiti and San Domingo, p. 29, 1885.

[f] Bowdish, Auk, XX, p. 18, 1903.

The records from central Massachusetts, St. John, New Brunswick, Beaver, Pa., Ottawa, Lanesboro, Minn., and Aweme, Manitoba, all make it probable that from May 5 to May 15, the magnolia warbler is migrating at a speed of 40 to 45 miles per day. If it is a fact, as seems probable, that all birds migrate faster as they near the northern part of their range, then it follows that the magnolia warbler either enters the United States several days previous to April 14, or else in its initial flight passes far inland.

In southern Texas, where the species is not common, the dates are comparatively late, as the following list shows: Lower Rio Grande, April 22, 1890; Corpus Christi, May 1, 1882, May 14, 1898; Bee County, April 20, 1887; San Antonio, May 12, 1891.

Records of the spring movements of the Magnolia warbler in Mexico and Central America are yet too meager to show any departures corresponding to the late appearance of the species in the United States. Sumichrast says that magnolia warblers occur from December to March in Oaxaca, Mexico; Richmond saw none after February 5 in Nicaragua; and along the eastern coast of Yucatan, where there was previously but a single record of occurrence, the parties of the Biological Survey found them in spring migration common to April 13. Some records of latest dates on which the birds were noted in spring in the southern part o the United States are as follows: Key West, Fla., May 17, 1887; Dallas, Tex., May 18, 1898; Helena, Ark., May 16, 1897; Shelby, Ala., May 12, 1898; St. Louis, May 18, 1884, May 22, 1885, May 18, 1887.

Fall migration.—Over much of the southern part of the Unite States the magnolia warbler, though rare in spring, is common in fall. The first fall migrants have been noted at Lanesboro, Minn., Augus 12, 1887; Grinnell, Iowa, August 20, 1886; Chicago, August 12, 1896 Englewood, N. J., and Washington, August 16, 1889; and Raleigh, N. C., September 11. In Chester County, S. C., the fourteen-yea records of Loomis show that the earliest arrival from the North durin that time was on September 3; that the bird is not uncommon in September; that the main body of migrants arrive about October 1; an that all are gone before October 15. Latest dates on which fall migrant were noted are: Aweme, Manitoba, September 17, 1900; Lanesboro, Minn., September 12, 1889; Ottawa, September 19, 1895; North River, Prince Edward Island, September 8, 1890; St. John, New Brunswick September 7, 1890; Chicago, October 9, 1894; Philadelphia, Octobe 9, 1888; Washington, October 10; and Asheville, N. C., October 10 1894. At New Orleans the species is one of the common fall migrants. During three years the average date of earliest arrival was Septembe 18; the birds were present in largest numbers from September 25 t October 7; and the dates on which the latest migrants were note ranged from October 23, 1897, to November 1, 1895. South of th United States the magnolia warbler has been taken at Truxillo,[a] Honduras, September 27, 1887, and the first arrival has been noted i southeastern Nicaragua,[b] October 27, 1892.

The general path of migration of the species seems to cross the middle of the Gulf of Mexico. It is bounded approximately on the eas by a line drawn from the north central part of Georgia to easter Yucatan, while few individuals seem to proceed farther west tha the coast line from eastern Texas to southern Vera Cruz. In commo with some twenty other species of birds the magnolia warbler seems t make its flight between the United States and Yucatan without takin advantage of the peninsula of Florida or using Cuba as a stoppin place. At the southern end of the Allegheny Mountains it is a common migrant, while it has been noted only three times in Florida an only once in Cuba.

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[a] Ridgway, Proc. U. S. Nat. Mus., X, p. 579, 1888.

[b] Richmond, ibid., XVI, p. 484, 1893.

658. Dendroica cerulea (Wils.). Cerulean Warbler.

Breeding range.—The principal summer home of the cerulean warbler is in the valley of the Ohio River. The species ranges eastward to Virginia, Maryland, western Pennsylvania, and western and central New York, but is much less common in this region, being rare east of the Allegheny Mountains. It occurs casually in New Jersey and southern New England. North of the Ohio Valley it ranges to southern Ontario, southern Michigan, and southern Minnesota. It is found regularly west to eastern Nebraska, eastern Kansas, and eastern Texas, while accidental occurrences have been noted at Denver, Colo., and Rio Mimbres, N. Mex. The southern limits of its regular breeding range are the mountains of Virginia and Tennessee; but it has been known to breed irregularly along the Choptank River in western Delaware, at Baltimore, Md., Greensboro, Ala., in Franklin and St. Tammany parishes, La., and in the Creek and Cherokee Nations, Okla. One of the parties of the Biological Survey took an old male and a young male of the year on June 24, 1902, at Texarkana, Tex.

Winter range.—The cerulean warbler is chiefly found in winter in South America from Panama south to Peru, in which country it seems to have its center of abundance. In western Peru Jelski[a] found it common at Monterico and other places in the mountains east of Lima at 10,000 to 13,000 feet elevation, always in wandering flocks, which were sometimes quite large and contained both old and young birds. Its abundance in northern Peru is remarked by Stolzmann.[b] In central Peru a specimen was taken in January, 1891, at Gloria[c] (3,200 feet), and a female on March 14, 1893, at San Emilio,[c] in the Valley of Vitoc (above 3,500 feet). In northeastern Peru Stolzmann took three cerulean warblers on February 10 and March 15, 1880, at Huambo[d] (3,700 feet). The southernmost records of the species are from Nairapi and Tilotilo[e] near La Paz, Bolivia, at an elevation of at least 13,000 feet, the greatest altitude at which the bird has been observed. Specimens were taken at Mapoto,[f] Machay,[f] and Sarayacu,[g] in central Ecuador, on dates ranging from November to February and at altitudes varying from 3,000 to 7,000 feet. Others were also secured on the Rio Napo,[h] in eastern Ecuador. The species is not uncommon on both coasts and in the mountains of Panama, but it seems to migrate through western Colombia, avoiding the mountains of the northern part, where it has not been found by any of the explorers who have made such large collections in the Santa Marta region. It has been taken at Medellin[a] in the mountains of central Colombia at 5,000 feet; at Bogota;[b] and there are specimens in the British Museum from the interior of Colombia and Antioquia.

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[a] Taczanowski, P. Z. S., p. 508, 1874.

[b] Taczanowski, Orn. du Perou, I, p. 465, 1884.

[c] Berlepsch and Stolzmann, P. Z. S., p. 330, 1896.

[d] Taczanowski, P. Z. S., p. 6, 1882.

[e] Sclater and Salvin, P. Z. S., p. 594, 1879.

[f] Taczanowski and Berlepsch, P. Z. S., p. 74, 1885.

[g] Sharpe, Cat. Birds Brit. Mus., X, p. 651, 1885.

[h] Sclater, P. Z. S., p. 64, 1858.

It is not probable that the cerulean warbler winters north of Panama, but there are a few records of the species during the migrations. It was seen four times during the fall migration at San José,[c] Costa Rica it was once taken at San Pedro[d] in northwestern Honduras, once by Gundlach in April in Cuba,[e] and once on the island of Grand Cayman,[f] and one struck the lighthouse at Cay Lobos,[g] Bahamas, April 26, 1901. There is no Nicaragua record. The only records between Honduras and Texas are of Deppe's[h] specimens, said to have been taken in Mexico Schott's record for Yucatan,[i] and those of the two specimens noted by Baird,[j] one as being in the cabinet of Lawrence and coming from Guatemala, the other one of Verreaux's birds, labeled "Coban, Guatemala." This species was not seen by any of the parties whose work formed the basis of the Biologia Centrali-Americana, nor has it been noted in Mexico by any of the parties of the Biological Survey.

Spring migration.—There is but one March record of the cerulean warbler in the United States, and this is of one taken on the 23d o the month in 1890 at the Tortugas. The spring records of the bird at Eubank, Ky., cover a period of eight years. The average date o the first bird seen is April 13; date of second seen, April 14; date when birds were common, April 20; extreme dates of first arrival, April 5 1892, and April 21, 1895. The earliest date for the species in Cheste County, S. C., is April 13, while at St. Louis the average date of arriva is April 15. Other records of average date of first seen are: Brookville, Ind., April 27; Beaver, Pa., May 1; Petersburg, Mich., May 2 and southern Ontario, May 7. In 1902 the first bird was reported from North Freedom, Wis., May 4, and in 1887 from Lanesboro Minn., May 5. These dates seem to determine quite closely the time of arrival of the earliest birds at their breeding grounds, but there are no corresponding dates for the Gulf Coast. The dates for Key West, Fla., are April 16, 1887, and April 29, 1889; for New Orleans April 8, 1898, and April 10, 1899. All the Texas records of firs arrivals are late: Brownsville, April 14, 1890; Corpus Christi, middle of April, 1900; Refugio County, April 17, 1899; Bee County, April 21, 1887; Dallas, April 20, 1898; Gainesville, April 15, 1887, and April 22, 1889. Records of arrival north of Texas are: Clinton, Ark., April 24, 1890; Statesbury, Mo., April 30, 1894; Independence, Mo., April 29, 1900, and Onaga, Kans., May 4, 1896.

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[a] Sclater and Salvin, P. Z. S., p. 494, 1879.

[b] Sclater, Cat. Am. Birds, p. 31, 1862. Sharpe, Cat. Birds Brit. Mus., X, p. 329, 1885

[c] Cherrie, Auk, IX, p. 21, 1892.

[d] Sclater and Salvin, P. Z. S., p. 836, 1870.

[e] Gundlach, J. f. Orn., p. 414, 1872.

[f] Cory, Auk, III, p. 501, 1886.

[g] Bonhote, Auk, XX, p. 171, 1903.

[h] Lichtenstein, Preis-Verz. Mex. Vög. 2, 1830.

[i] Lawrence, Ann. Lyc. Nat. Hist., IX, p. 200, 1869.

[j] Baird, Rev. Am. Birds, I, p. 191, 1865.

Fall migration.—The cerulean warbler is a rare migrant in the States along the Atlantic coast, though it has been noted in the Carolinas, Georgia, and Florida. In northeastern Texas and Louisiana it is not uncommon. Its main route of migration seems to cross the Gulf of Mexico chiefly from Louisiana and Mississippi. The species is one of the first to start on the southward migration. By the middle of summer it has reached the Gulf coast and is well on its way to its winter home. At Beauvoir and Bay St. Louis, on the coast of Mississippi, it has appeared in different years on dates ranging from July 12 to 29. For a few days it is common, attaining the height of its abundance about the first week in August. It then passes southward so rapidly that Cherrie was able to record its presence on August 24, 1890, at San José, Costa Rica. By November it reaches central Ecuador. Though the bulk of the birds perform their migration at this early date, some laggards remain behind until late in the season. Records of latest migrants are: London, Ontario, September 1, 1900; Livonia, Mich., September 1, 1892; Beaver, Pa., September 14, 1889; and Berwyn, Pa., September 27, 1889. At Eubank, Ky., migration movements were recorded for the eight years 1888 to 1895. The average date of the last bird seen at this locality, where the species breeds abundantly, is August 23, and the latest date is September 14. In Chester County, S. C., just across the mountains from Eubank, where the earliest southbound birds are reported to arrive by August 3, the species has been seen as late as October 22. In 1886 in central Texas some small flocks were reported as late as October. It would seem that these were unusually late birds, for Cherrie states that the latest migrants leave San José, Costa Rica, by the end of October.

659. **Dendroica pensylvanica** (Linn.). Chestnut-sided Warbler.

Breeding range.—Throughout New England, New York, and Pennsylvania the chestnut-sided warbler is one of the commonest breeding warblers. It also breeds regularly, though not commonly, in parts of northern Ohio, Indiana, and Illinois, and westward to eastern Nebraska, nesting in the latter State as far south as Omaha. It has been taken once in Wyoming. Its northward range is at least to Newfoundland, Ontario, and the Saskatchewan. South of its normal breeding range it has been noted in summer at St. Louis and at Munger in southeastern Missouri, and a few times in the lower Wabash Valley of Illinois and Indiana. It has been once recorded as breeding at Sea Isle City, near the coast at the extreme southern end of New Jersey. In the Allegheny Mountains the bird breeds much farther south. During the breeding season it is common to abundant in the mountains of North Carolina at an elevation of 2,000–4,000 feet and not uncommon at corresponding elevations in the northwestern part of South Carolina. It probably breeds sparingly in northern Georgia.

Winter range.—The chestnut-sided warbler winters from Guatemala to Panama, both on the coast and in the lower mountains. It is abundant along the coast of southeastern Nicaragua[a] and less common throughout Guatemala. There are four records of its occurrence in Honduras—at San Pedro and Truxillo,[b] on the north coast, and on the islands of Bonacca[c] and Ruatan.[c] The only record for Yucatan[d] is of a specimen taken at Merida April 18, 1865. There are records from Costa Rica which denote that the species occurs in September on the high plateaus,[e] is abundant during the fall migration, and rare in the spring at San José[f] (3,500 feet), and was common during the fall of 1895 on the Pacific slope at Miravalles[g] (1,400–2,000 feet). The only Mexican records, probably all made during migration, are of specimens taken in April at Playa Vicente[h] on the hot lowlands of Oaxaca on May 16, 1888, at Canyon Cavelleros, Tamaulipas; and at Jalapa, State of Vera Cruz.

Late writers have commonly included the Bahamas in the winter range of the chestnut-sided warbler. Nearly half a century ago Bryant recorded that he saw in May a few of the species on the island of New Providence. These were undoubtedly spring migrants that had wandered far out of their usual course. Years afterward a writer quoted this note as a winter record, and his mistake has been perpetuated. Other records of wandering birds were made at the Bermudas in the spring of 1901; at Enterprise, on the east coast of Florida, soon after the middle of March; near the mouth of the Suwanee River Florida, April 10, 1892.

Spring migration.—The records of spring migration of the chestnut-sided warbler in the United States south of the latitude of Washington and St. Louis are entirely without regularity. For the sake of having the material on record, the dates are here given:

Highlands, N. C., April 21, 1886; Raleigh, N. C., April 27, 1886 April 30, 1890; Asheville, N. C., April 29, 1894, April 26, 1899

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[a] Richmond, Proc. U. S. Nat. Mus. XVI, p. 484, 1893.
[b] Ridgway, Proc. U. S. Nat. Mus. X, p. 579, 1888.
[c] Salvin, Ibis, p. 249, 1888.
[d] Lawrence, Ann. Lyc. Nat. Hist. IX, p. 200, 1869.
[e] Cabanis, J. f. Orn., p. 328, 1860.
[f] Cherrie, Auk, VII, p. 336, 1890.
[g] Underwood, Ibis, p. 433, 1896.
[h] Sclater, P. Z. S., p. 374, 1859.
[i] Sclater, P. Z. S., p. 363, 1859.

Kirkwood, Ga., April 23, 1893, April 23, 1894, April 27, 1895, April 17, 1896, April 30, 1897, April 26, 1898, April 24, 1900, April 30, 1901, average, April 25; Rising Fawn, Ga., April 29, 1885; Shellmound, Miss., April 15, 1892; Rodney, Miss., April 28, 1890; Bayou Sara, La., April 22, 1887; Mount Carmel, Mo., April 23, 1885, April 25, 1886; St. Louis, May 3, 1882, April 27, 1883, May 6, 1884, April 29, 1885, May 11, 1886, May 8, 1887, May 5, 1888; lower Rio Grande, Tex., May 13, 1878; Brownsville, Tex., April 17, 1890; Corpus Christi, Tex., May 1, 1884, April 22, 1891, April 19 and 29, 1900. The species is a rapid migrant, being present scarcely more than three weeks during spring migration at any point in the Gulf States. North of this district some records of average date of arrival are: Frenchcreek, W. Va., May 2; Washington, May 3; Beaver, Pa., May 2; Renovo, Pa., May 3; southeastern New York, May 6; Boston, May 6; southern New Hampshire, May 8; Lewiston, Me., May 12; Montreal, May 17; Scotch Lake, New Brunswick, May 23; Brookville, Ind., May 4; Chicago, May 6; Petersburg, Mich., May 6; southern Ontario, May 6; Parry Sound district, Ontario, May 11; Ottawa, May 14; Grinnell, Iowa, May 5; Lanesboro, Minn., May 9; Minneapolis, Minn., May 12; Elk River, Minn., May 14; northern Minnesota, May 19; Aweme, Manitoba, May 20. The arrival of the species in 1895 at Halifax, Nova Scotia, was noted on May 24.

Fall migration.—Migrating chestnut-sided warblers were noted at Englewood, N. J., July 26, 1887; Washington, August 10, 1889, and Frenchcreek, W. Va., September 6, 1892. The earliest recorded arrival of the species in fall at Raleigh, N. C., was on August 17, 1891. In Chester County, S. C., the bird has been noted as early as August 16. The first arrivals were noted at San José, Costa Rica, September 28, 1889, and September 21, 1890. The bulk of the species passes through the Carolinas in September, reaches the Gulf coast the latter part of the month, and arrives at Costa Rica by the middle of October. The bird was taken at Truxillo, Honduras, September 26, 1887. The last southbound migrants were noted at Ottawa September 12, 1885; St. John, New Brunswick, September 10, 1895; Berwyn, Pa., October 3, 1891; Washington, September 29, 1889; and Frenchcreek, W. Va., September 28, 1890. In the Southern States stragglers occur until after the middle of October. It is thus seen that at the south end of the Allegheny Mountains the fall migration of the chestnut-sided warbler lasts fully two months, while the spring migration occupies not more than three weeks.

Fall migration in the Mississippi Valley is not very different from that in the East. The earliest recorded arrival at St. Louis was on August 24, 1896, and the average date of earliest arrival at New Orleans for several years was September 15. Chestnut-sided warblers have been noted as late as August 24, 1901, at Aweme, Manitoba September 15, 1889, at Lanesboro, Minn.; September 25, 1887, a Grinnell, Iowa, and September 26, 1895, at Chicago.

The migration route of the species across the Gulf of Mexico appear to agree closely with that of the cerulean warbler.

660. **Dendroica castanea** (Wils.) Bay-breasted Warbler.

Breeding range.—The bay-breasted warbler breeds in northern Nev England, Nova Scotia, southern Ontario, northern Michigan, Manitoba, and north to Hudson Bay and Newfoundland; also probably i northern Minnesota. It was taken by one of the parties of the Biological Survey at Oxford House, Keewatin, July 3, 1900, and at For Chippewyan May 28, 1901. It is thus strictly a bird of the Canadia fauna, except that a few nest in southern Ontario.

Migration range.—There are three published records of the occurrence of the bay-breasted warbler in migration in Texas,[a] a specime in the American Museum of Natural History was taken at Corpu Christi, Tex., May 1, 1882, and one struck the light at Port Bolivar Tex., May 6, 1893. The bird is not recorded as occurring in the Wes Indies, nor in Florida, Alabama, or Georgia. It is so rare in Cheste County, S. C., that Loomis saw it but twice—May 14, 1887, and May 5 1888—in all his years of collecting. It is not included in Smithwick' list of North Carolina birds, and Brimley has seen but one at Raleigh— September 17, 1887. The species is certainly uncommon along th south Atlantic coast, and, though more common northward from Virginia, is very irregular in different years. In the Ohio Valley it i also irregular, and varies each year from rare to quite abundant. I is a regular, but not usually common, migrant in spring and fall in th Mississippi Valley.

The edge of the forests in Minnesota marks the normal wester limit, while Iowa and Missouri mark the western boundary in thei respective latitudes. A wanderer was taken in May, 1888, at Pierre S. Dak., by one of the parties of the Biological Survey; Eugene Coubeaux took one May 24, 1903, at Big Sandy, Mont.; and the specie is a rare migrant in Assiniboia west to Medicine Hat. The earlie records of an occurrence in Nebraska have not been verified by late observers, and the bird is not recorded from Kansas.

Winter range.—All the winter records of the bay-breasted warble come from a rather restricted area in Colombia, South America, an the Isthmus of Panama. In the latter district the species is not uncommon. In Colombia it has been taken at Medellin[b] and Naranjo[c] i the valley of the Magdalena; at Remedios[a] in the valley of the Cauca, and at Bucaramanga[b]—all localities in the forest region at 2,000 to 3,000 feet altitude. In fall migration it has been secured at Bonda[c] on the north coast. West of Panama the records of its occurrence are meager. It has been recorded once from Costa Rica,[d] as would be expected from its occurrence in Veragua, Panama, close to the Costa Rican boundary. It has been taken on the island of Ruatan,[e] Honduras, and was recorded by Sclater and Salvin from Guatemala.[f] A specimen in the U. S. National Museum is marked as taken in Guatemala by Taylor. The species was long regarded as a bird of Mexico on the strength of a specimen recorded as taken by Sumichrast at Tehuantepec City[g] October 19, 1869. This specimen, which is still in the U. S. National Museum, is really a specimen of *D. striata.* At the present time there is no sure record of the occurrence of *D. castanea* in Mexico.

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[a] Merrill, Proc. U. S. Nat. Mus., I, p. 124, 1878. Dresser, Ibis, p. 478, 1865. Nehling, B. N. O. C., VII, p. 9, 1882.

[b] Sharpe, Cat. Birds Brit. Mus., X, p. 322, 1885.

[c] Wyatt, Ibis, p. 322, 1871.

Spring migration.—No consistent idea of the spring migration of the bay-breasted warbler can be drawn from the scanty records of its appearance in the southern United States. There are few or no dates for April. During the first week of May the bird appears in the district south of St. Louis and Washington, and thence, proceeding eisurely northward, arrives on the average at Beaver, Germantown, and Renovo, Pa., May 13; southeastern New York, May 8; central Connecticut, May 15; central Massachusetts, May 16; southern Maine, May 18; and St. John, New Brunswick, May 21. It was noted at Pictou, Nova Scotia, May 23, 1895. The movement of the species west of the Alleghenies is at about the same time, the average date of the first seen at Chicago being May 5; in southern Wisconsin, May 11; n southern Ontario, May 12; at Ottawa, May 17, and at Aweme, Manitoba, May 16.

Fall migration.—The return migration of the bay-breasted warbler begins in August. During six years of observation at Chicago the first migrant was seen on the average on August 27, the earliest date being August 13, 1896. Other early dates are September 7, 1903, at Beaver, Pa., and August 26, 1887, at Englewood, N. J. Most of the migration in the central part of the United States takes place during September, and by October the bay-breasts have reached South America. Last migrants have been noted at Aweme, Manitoba, August 22, 1901; Lanesboro, Minn., September 15, 1889; Ottawa, September 16, 1888; St. John,

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[a] Sclater and Salvin, P. Z. S., p. 494, 1879; Sharpe, Cat. Birds Brit. Mus., X, p. 650, 1885.

[b] Berlepsch, J. f. Orn., p. 282, 1884.

[c] Allen, Bull. Am. Mus. Nat. Hist., XIII, p. 177, 1900; Auk, XVII, 367, 1900.

[d] Zeledon, Proc. U. S. Nat. Mus., VIII, p. 105, 1885.

[e] Salvin, Ibis, p. 249, 1888.

[f] Sclater and Salvin, Ibis, p. 11, 1859.

[g] Lawrence, Bull. Nat. Mus., No. 4, p. 15, 1876.

New Brunswick, September 1, 1890; Chicago, October 4, 1897, and at Germantown, Pa., October 19, 1885. It will be seen at once that there is no easy solution of the line of migration of the bay-breasted warbler between its summer and winter homes. The data are so meager that the line of migration must be judged from the movements of other species. The principal route seems to be much the same as that taken by *D. cerulea* and *D. pensylvanica.* The bay-breasts apparently make the long flight across the Gulf of Mexico to the highlands of Guatemala and Honduras, and then follow the mountains to Panama and Colombia.

661. **Dendroica striata** (Forst.). Black-poll Warbler.

Breeding range.—The summer home of the black-poll warbler is entirely within the Canadian and Hudsonian zones. The species breeds in northern Maine, the mountains of northern New England and New York, northern Michigan, and Manitoba, and ranges north to the Gulf of St. Lawrence, Newfoundland, the limit of tree growth in Labrador and Hudson Bay, and northwest to Alaska. The southernmost breeding record is at Seven Lakes, near Manitou, Colo., at an altitude of 11,000 feet. The black-poll occurs regularly though sparingly in Colorado, less commonly in New Mexico (in migration), and northwest through Montana to Log Cabin, Yukon, and Cook Inlet Alaska.

Winter range.—The black-poll warbler winters in the northern par of South America, ranging east to the Oyapock River[a] in eastern French Guiana and to Para, Brazil.[b] It has been taken in Novembe and January in British Guiana[c] at an altitude of 3,700 feet; it has als been secured in fall migration near Merida,[d] Venezuela, at 5,400 feet and several times in the vicinity of Bogota,[e] Colombia, at probably not much less than 9,000 feet. During the fall migration of 189 many specimens were taken from October 7 to November 22 at Bonda on the northern coast of Colombia, and at Mamatoca[g] October 13, an at Cantilito[g] October 14. A large number of specimens were secure from November 21 to April 25 at various places in the lower portion of the valleys of the Orinoco[h] and Caura[h] rivers, which shows that th region is one of the main winter homes of the black-poll warbler There are records of the occurrence of the species on the Rio Negro of Brazil, and at Archidona[a] and Sarayacu,[b] central Ecuador. A straggler was once taken at Valdivia,[c] Chile.

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[a] Sharpe, Cat. Birds Brit. Mus., X, p. 650, 1885.

[b] Spix. Av. Bras. I, 75, 1824; Burmeister, Thiere Bras. III, 120, 1856.

[c] Salvin, Ibis, p. 202, 1885. Quelch, Timehri, X, p. 261, 1896.

[d] Sclater & Salvin, P. Z. S., p. 780, 1870. Ernst, Flora & Fauna Venez. 301, 187

[e] Sclater, P. Z. S., p. 143, 1855. Baird, Rev. Am. Birds, p. 192, 1865.

[f] Allen, Bull. Am. Mus. Nat. Hist., XIII, p. 177, 1900; Auk, XVII, p. 366, 190

[g] Specimens in Carnegie Museum, Pittsburg, Pa.

[h] Berlepsch & Hartert, Novit. Zool., IX, p. 9, 1902.

[i] Sharpe, Cat. Birds Brit. Mus., X. p. 327, 1885. Pelzeln, Orn. Bras. 69, 463, 186

The black-poll warbler does not winter in the Bahamas or any other part of the West Indies—a point that needs to be emphasized, as there is a tendency on the part of writers to consider all records south of the United States as wintering records. The bird is, however, a common visitor to the Bahamas both in spring and fall. It has been taken at points ranging from the northern Bahamas to Watlings Island on the east, Anguila[d] on the west (where it was found abundant May 10–11, 1893), and Inagua at the south. In Cuba it occurs in migration in spring and fall, usually in small flocks. It has been recorded also from Jamaica and Porto Rico. It was seen in great numbers October 10, 1882, on Guadeloupe Island;[e] and has been taken on Santa Lucia,[f] Barbados,[g] Tobago,[h] and Trinidad,[i] the latter just beyond the extreme end of the West Indies and near the northern coast of eastern Venezuela.

The specimen of the black-poll warbler taken at Tehuantepec City, and noticed under *D. castanea*, furnishes the only record for Mexico, and was undoubtedly a straggler.

Spring migration.—In the eastern part of the United States the black-poll warbler is well known as a late migrant—one of the latest mong the warblers. There are no records of its being observed in March anywhere north of its winter home, not even in the West Indies. Gundlach says that when black-polls occur in spring in Cuba, they are found in April. Bonhote noted the first spring arrivals on the island of New Providence, Bahamas, April 21, 1898, and at Cay Lobos light April 15, 1901. Winch took his first specimen on the island of Inagua April 23, 1891. The dates of Bonhote are later than some on which the species has been noted at the Florida lighthouses. It struck ombrero Key lighthouse April 14 and 15, 1885; April 24 and 25, 1887, and April 18 and 30, 1888.

Some dates of arrival in the southeastern part of the United States re: Tortugas, April 26, 1890; Suwanee River, Florida, April 24, 1893; Frogmore, S. C., April 29, 1885; Darien, Ga., April 28, 1890; Rising Fawn, Ga., April 17, 1885; Shelby, Ala., April 27, 1898. A black-

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[a] Goodfellow, Ibis, p. 314, 1901.

[b] Sharpe, Cat. Birds Brit. Mus., X, p. 650, 1885.

[c] Landbeck, Arch. für Naturg., p. 56, I, 1864. Anal. Univ. Chile, XXIV, p. 336, 864. Philippi, Anal. Univ. Chile, XXXI, pp. 257, 328, 1868. Sclater, P. Z. S., 337, 1867. James, New List Chilian Birds, p. 2, 1892. Reed, Catálogo de las Aves Chilenas, p. 6, 1896. Philippi, Anal. Mus. Nac. Chile, p. 41, 1902.

[d] Cory, Auk, VIII, p. 352, 1891.

[e] Lawrence, Proc. U. S. Nat. Mus., VIII, p. 622, 1885.

[f] Allen, B. N. O. C., V, p. 166, 1880.

[g] Feilden, Ibis, p. 482, 1889.

[h] Sclater, Cat. Am. Birds, p. 32, 1862.

[i] Sclater, Cat. Am. Birds, p. 24, 1862.

poll warbler came aboard a ship 50 miles off the coast of South Carc
lina, April 19, 1898. The average date of earliest arrival from th
south during nine years' observation near Atlanta, Ga., is April 3
with extremes of April 23, 1894, and May 10, 1901. The seven year
average at Raleigh, N. C., is May 2, with extremes of April 29, 188
April 30, 1891, and May 5, 1890. The average of five years in th
mountains at Asheville is May 5, with extremes of April 29, 1893, an
May 10, 1890. The dates of first arrival for several successive yea
at St. Louis are remarkably uniform—April 29, 1884, 1885, and 188
May 1, 1886, and April 28, 1888. Thus arrival from the south at S
Louis is three days earlier than at Raleigh; this in spite of the su
position that the birds come from the southeast and the fact that S
Louis is farther north by 200 miles than the North Carolina point
observation. Compared with dates of arrival near Atlanta, Ga., thos
at St. Louis show a difference of but one day in the average, althoug
nearly 500 miles measure the difference in distance along the south
east and northwest line of migration between the two points. Alon
the Atlantic slope some records of average date of arrival are: Wash
ington, May 6; Philadelphia, May 8; southeastern New York, Ma
15; central Connecticut, May 15; Boston, May 17; southern Ne
Hampshire, May 21, and Lewiston, Me., May 23. The first arriv
was noted at Montreal, May 28, 1892; Godbout, Quebec, June 6, 18
and 1887, and North River, Prince Edward Island, June 10, 189
Records of averages west of the Alleghenies are: Chicago, May 1
southern Wisconsin, May 16; southern Michigan, May 14; souther
Ontario, May 17, and Ottawa, May 21. Near the Mississippi t
dates of arrival are somewhat earlier, averaging, at St. Louis, Apr
30; Keokuk, Iowa, May 9, and Lanesboro, Minn., May 16. T
migration route thence bears strongly northwestward, and the blac
polls reach Alaska in the last week of May.

The black-poll warbler is common along the Mississippi from S
Louis northward, while west of the mouth of the river, along the Gu
coast, and in Texas it is almost unknown. It is fairly common wes
ward to the Missouri River, but is scarcely or only locally known
the Plains region. Of more than twenty observers in Kansas on
two report seeing this species, and one of these saw it but once
eleven years of active observation. The earliest arrival noted
Kansas was May 12, 1885, at which time the birds were already mu
farther north along the Mississippi River. At the western edge of i
range along the foothills of the Rocky Mountains the species is rar
It reaches the Arkansas River in the first week in May and northe
Colorado a week later. There can be no doubt that the great bulk
the western individuals of the species pass north along the fore
region of the Mississippi and through the corresponding region
Minnesota.

The main body of migrants reaches the southern part of the United States early in May. About half of the records of spring migrants triking the Florida lighthouses fall between May 1 and May 9. The pecies was especially common in the spring of 1888, when it struck May 4, 5, 6, 8 (about 50 birds), and 12. In the previous spring it was most common May 18, 19, and 20. It was abundant on the island of Anguilla May 10 and 11, 1891, and very abundant on the island of New Providence May 1–10. On the neighboring Andros Island the ast bird to pass north was noted May 23, 1890, a date which does not iffer much from the dates of passage of the latest migrants at various oints on the mainland. The last migrant was noted at Raleigh May 28, 1886, May 26, 1888, May 23, 1889, and May 29, 1891; at Asheville May 30, 1891, and June 1, 1894, and at St. Louis May 22, 885, May 18, 1886, and May 19, 1887.

Fall migration.—Some of the black-poll warblers have the most istinctly northwest and southeast fall migration route of any of the wide-ranging species. Individuals that nest in Alaska winter in orthern South America without passing through either Mexico or Central America, so far as known. The species uses the Florida and West India routes, and is common enough to be fairly well known long the entire way.

The black-polls that summer in the northeastern United States nest n June, and begin in August their fall migration, and have been seen s early as August 30 at Ossining, N. Y.; August 27, 1891, at Beaver, Pa.; August 30, 1887, at Englewood, N. J., and September 1, 1889, at Washington. The western birds have appeared at Chicago August 3, 1897; Cleveland, Ohio, August 27, 1886, and St. Louis, September 2. In 1881 the earliest date on which a fall migrant struck Fire sland light on the south shore of Long Island was September 9. The arliest date of first arrival in seven years at Raleigh, N. C., was September 24, and the average October 2. The black-polls linger late in he North, having been noted at Great Bear Lake, Mackenzie, August 9, 1904; Ottawa September 27, 1887; Chicago, October 12, 1902; Portland, Conn., October 20, 1888; Philadelphia, October 29, 1887; and Washington, October 20, 1889.

The black-poll warbler is easily attracted to lighthouses. At Sombrero Key, Fla., it has struck the light on thirty-five different nights n five consecutive years, the earliest certain date being September 25, 888. Most fall migrants strike in the first half of October, and about third of the records are of single birds. Sometimes, however, the black-polls are very abundant. In 1887 they struck on every night from October 13 to 17, being especially numerous October 14 and 6. The keeper of the light says that on October 14 the birds flew ow, and that 40 were seen at one time on the lantern, 8 of which were illed. After sunrise there were found on the lower platform 20 live

and 87 dead birds. Few of these fell from the lantern, as the wir
would have swept them overboard beyond the balcony. They we
killed by striking, not the lantern, but the framework of the towe
This count probably represents not more than a fourth of the injur
birds, as the Sombrero Key light is surrounded by water, into whi
most of the birds that strike soon flutter or fall. Large numbers
black-polls have also perished at two lighthouses on the south shore
Long Island. At Shinnecock, September 30, 1883, 59 dead birds we
found around the light, and on the same day 230 were counted at t
foot of Fire Island light. The latest date of striking at these norther
lighthouses is October 20, 1882. The latest dates of passing fa
migrants at Raleigh are November 5, 1886, and November 1, 188
Some late dates from the Florida lighthouses are November 16, 188
November 4 and 10, 1888, and November 2 and 7, 1891. On the isla
of New Providence, Bahamas, one bird was seen as late as Novemb
26, 1898.

The recorded appearance of the black-poll warbler at Bonda, Colo
bia, on October 7 shows that the early migrants do not linger on t
road. The further facts that they are rare or accidental in Jamaic
are not known in Haiti, and are not nearly so common in Cuba
might be expected from their numbers in the southeastern part of t
United States indicate that quite a large proportion of the speci
make but short stops in the West Indies south of the Bahamas. Blac
polls appear to make a regular stopping place of the northern Bahama
but, except for occasional flocks, pass over the southern islands wit
out stopping. The records are not yet complete enough to sho
whether the birds of Guiana come overland from Colombia or by wa
of the islands.

662. **Dendroica blackburniæ** (Gmel.). Blackburnian Warbler.

Breeding range.—The summer home of the Blackburnian warbler
in the forests of the northern portions of Minnesota, Wisconsin, Mich
gan, New York, and New England. The species is also common in t
Catskill Mountains of New York and in some of the elevated parts
Massachusetts, and a few also breed in the Alleghenian life zone of th
State and perhaps Connecticut. In Pennsylvania and through t
southern Allegheny Mountains to South Carolina, in both Canadi
and Alleghenian zones, a few also summer. Northward the speci
extends to Cape Breton, northeastern Quebec, central Ontario, southe
Keewatin (Severn House and Trout Lake), and Manitoba.

Migration range.—The range in migration extends westward to t
plains of eastern Texas, eastern Kansas, and eastern Nebraska, thou
the bird is rare west of the forest region of the Mississippi. It h
been taken as an accidental visitant in Utah and New Mexico.

Winter range.—A small body of Blackburnian warblers winter at

levation of 4,000 to 6,000 feet in the highlands of Guatemala to as far
outh as Duenas. A few remain as far north as Merida, Yucatan. and
rizaba, Vera Cruz. The species has been taken at Tehauntepec City,
axaca, the only point on the Pacific coast north of Costa Rica at
hich its presence has been recorded. In migration it has been seen
n the lower plains of San Luis Potosi and at Tampico. The bulk of
he species seem to pass through Honduras[a] and apparently continue
outh until they reach the mountain sides, and then follow the moun-
ain chain through Costa Rica and Panama. Unfortunately the data
t hand are such that the wintering records can not be separated from
ose of migration. It seems certain, however, that only a few of the
pecies remain farther north than Costa Rica, and but few of the thou-
ands that pass through that country remain to winter there. The
al winter home of the Blackburnian warbler is in South America,
rom central Colombia to central Peru. In Colombia directly east of
e Isthmus of Panama the species has been found to be very common
winter from Pamplona,[b] Medellin,[c] and Bogata[d] southward. It
equents the heavy forests, and is common above 6,000 feet nearly to
,000 feet, especially just below its highest range. It does not usually
ange below 5,000 feet, but has been once taken only a little above
,000 feet. A few individuals move northeastward and have been
ken at Las Nubes[e] and Valparaiso[e] in the Santa Marta region of
orthern Colombia, and at Merida[f] in western Venezuela—in both
istricts at 4,500–5,500 feet elevation. In Ecuador[g] the species occurs
n both slopes of the Andes, more commonly at altitudes between
,500 and 7,000 feet—rarely to 9,000 feet—though during both spring
nd fall migrations it has been found at 3,500 feet. In February, 1899,
was "as thick as autumn leaves" at Papallacta,[h] eastern Ecuador, at
1,500 feet. It is common in northern Peru[i] at 3,700–7,000 feet, and

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[a] Salvin, Ibis, p. 249, 1888.

[b] Wyatt, Ibis, p. 322, 1871.

[c] Sclater and Salvin, P. Z. S., p. 494, 1879.

[d] Sclater, Cat. Am. Birds, p. 30, 1862. Salvin, Cat. Strickland Coll., p. 90, 1882.
later, P. Z. S., p. 143, 1855.

[e] Allen, Bull. Am. Mus. Nat. Hist., XIII, p. 178, 1900; Auk, XVII, p. 367, 1900.

[f] Sclater and Salvin, P. Z. S., p. 780, 1870. Ernst, Flora and Fauna, Venez, 301,
77.

[g] Sclater, P. Z. S., p. 111, 1854; p. 64, 1858; pp. 64 and 84, 1860; Ann. and Mag.
at. Hist., XVI, p. 281, 1855. Allen, Bull. Am. Mus. Nat. Hist., II, p. 69, 1889.
rton, Am. Nat., V, p. 623, 1871. Hartert, Novit. Zool., V, p. 480, 1898. Berlepsch
d Taczanowski, P. Z. S., p. 286, 1884; Taczanowski and Berlepsch, P. Z. S., p. 74,
85. Salvadori and Festa, Boll. Mus. Zool. Torino, No. 357, p. 8, 1899. Sharpe, Cat.
rds Brit. Mus., X, pp. 291 and 646, 1885.

[h] Goodfellow, Ibis, p. 314, 1901.

[i] Taczanowski, P. Z. S., p. 508, 1874; p. 223, 1879; p. 6, 1882. Orn. du Perou, I,
464, 1884. Berlepsch and Stolzmann, P. Z. S., p. 331, 1896.

has been traced as far south as the mountains near Lima, in centra Peru.

Most accounts of the species include the Bahamas in its winte range, but the only records from these islands are of one occurrenc in April[a] and one in October,[b] both during migration and undoubtedl accidental. It is not probable that any individual spends the winte within many hundred miles of the Bahamas. The only other recor made in the West Indies is one of accidental occurrence on the islan of Tobago.

Spring migration.—Records of the Blackburnian warbler fro points south of the United States are not sufficient to permit tracin the movements of the species northward to the southern boundary, nc is there any correspondence of dates of its occurrence until it ha advanced many miles inland. The bird is common in spring at Asheville, N. C., where the average date of arrival for five years is Apr 14. In Chester County, S. C., it is a rare spring migrant, while a Raleigh, N. C., it was not seen in spring during many years' collec ing. At both these places, however, it is common in the fall. A White Sulphur Springs, W. Va., the average date of spring arriv for several years is April 22, and at French Creek, W. Va., April 2 the earliest dates at the two places being April 17, 1893, and April 2 1891, respectively. The average of first dates at Washington is Ma 6; Beaver, Pa., and Alfred, N. Y., May 4; Portland, Conn., May northern Massachusetts, May 9; southern New Hampshire, May southern Maine and Montreal, May 16. Records of first arrival ar Quebec, May 18, 1901; Petitcodiac, New Brunswick, May 18, 188 and Pictou, Nova Scotia, May 30, 1894. The three years' average closely agreeing dates of arrival in central Mississippi is April 14; th earliest date at New Orleans is April 8, 1900. Brookville, Ind., reached on the average May 2, Chicago May 3, southern Michiga May 6, southern Ontario May 7, Parry Sound District, Ontario, Ma 8, Ottawa May 11, southern Wisconsin May 9, Lanesboro, Minn May 15. At Aweme, Manitoba, an arrival was noted on May 20, 189

The average rate of migration of the Blackburnian warbler fro the mouth of the Mississippi to its source, where the bird breed appears to be scarcely 25 miles per day. The species is a rare migra in Texas, and the records of arrival are not regular. Among the may be mentioned the following: Brownsville, April 20, 1890; Corp Christi, March 13, 1899; Refugio County, April 17, 1899; Bee Count April 20, 1887; San Antonio, March 31, 1880, April 1, 1890; Kenda County, March 31, 1880; Houston, April 20. In correspondence wi these dates, rather than with those of Mississippi, Indiana, and Mi nesota, are the dates of earliest arrival at St. Louis—May 10, 188

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[a] Bryant, Proc. Bost. Soc. Nat. Hist., VII, p. 110, 1859.

[b] Cory, Auk, IX, p. 49, 1892.

May 12, 1885, May 6, 1886, and May 12, 1887. The latest dates in spring at which the species was observed south of the United States are as follows: Northern Peru, March 25; western Ecuador, March 17; northern Ecuador, April; Santa Marta region of Colombia, March 29; San Luis Potosi, Mexico, first week in May. Late records of occurrence in spring in Texas are May 3 on the Rio Grande; May 11, 1900, near Brownsville, and May 15, 1898, at Dallas. A female was killed n May, 1876, near Fort Bayard,[a] N. Mex., far out of the usual range.

Fall migration.—The fall migration of the Blackburnian warbler begins in August, the southward movement of the Allegheny breeding birds having its inception early in the month. Fall migrants have been noted as follows: Chicago, August 12, 1900; Englewood, N. J., August 11, 1887; Washington, August 15, 1886; in Chester County, S. C., by August 8, and at Bay St. Louis, Miss., August 11, 1898. The first arrival from the north was noted at San José,[b] Costa Rica, August 17, 1890, in which year the species again appeared on August 20 and was common until October. The August birds of Costa Rica represent the van of south migration. By the middle of October the earliest migrants have reached Venezuela and Ecuador. The main army of the Blackburnians pass the south end of the Alleghenies between September 25 and October 5, and during the first two weeks of October are moving through San José, Costa Rica, and by early in November are settled for the winter in Peru. Some records of late migrants along this route are: Toronto, October 1, 1898; Philadelphia, September 28, 1890; Washington, October 5; Lynchburg, Va., October 9, 1898; Raleigh, N. C., October 8, 1887, October 4, 1888, October 13, 1891; Asheville, N. C., September 15, 1890, September 20, 1894; Chester County, S. C., October 22; Tarpon Springs, Fla., October 15, 1886; Key West, October 21, 1887. Along the westward route the atest migrants leave the region of Lake Michigan about the 1st of October. The latest fall date at St. Louis is October 2, 1896; latest at New Orleans are October 9, 1896, October 18, 1897, and October 18, 1901. Cherrie found no Blackburnians wintering at San José,[c] Costa Rica, where the species disappeared soon after the middle of October and did not reappear until spring at which time it was rare.

One of the strange features of the life-history of the Blackburnian warblers which winter in South America is the length of time spent by them in their winter home, notwithstanding the fact that the individuals which breed in Canada have at least 3,500 miles to travel twice each year. The species is common from October to March in northern Peru, the latest date on which it has been observed there being March 25, 1878. This gives full five months in Peru and leaves only seven months for the migration to and from North America and the entire breeding season. If this latter covers not less than ten weeks then during the rest of the year—more than a third—the bird must b traveling at an average rate of 50 miles per day.

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[a] Stevens, B. N. O. C., III, p. 93, 1878.

[b] Cherrie, Auk, VIII, p. 278, 1891.

[c] Cherrie, Auk, VII, p. 336, 1890.

663. **Dendroica dominica** (Linn.). Yellow-throated Warbler.

Breeding range.—The yellow-throated warbler is a species of quit limited extension. Its range is east of the Allegheny Mountains North of Maryland the bird is rare or casual, though it breeds nea the Choptank River in southwestern Delaware. It breeds in th Carolinian and Austroriparian zones, and seems to desert in summe the tropical zone of southern Florida.

Winter range.—The southernmost recorded winter home of th yellow-throated warbler is the island of Jamaica. Since the specie does not move north until early March, the Jamaican individuals spen about seven months of the year in their winter home. The bird is als a winter resident of the Bahamas, Cuba, Haiti, Porto Rico, and Gran Cayman, and there is one record for Yucatan. It winters abundantl in southern Florida, less commonly in the northern part of the State and locally along the Atlantic coast to South Carolina.

Spring migration.—The yellow-throated warbler is one of the earl migrants. Its arrival at Gainesville, Fla., has been noted on March 2 1887, and it has been recorded as abundant by March 5 near Jacksonville. The earliest dates of striking at the lighthouse at Sombrer Key, Fla., are March 28, 1887, March 11, 1888, and March 3 and 11 1889. Reports do not show that this species is ever present at the lighthouses in large numbers, fifteen in one night being the highest numbe observed. Small parties pass for several weeks, but the spring migration is not extended like that of fall. All the recorded spring observations of the bird at the lighthouses are included between March 3 an April 4. There is a greater difference between the time of spring arriva at Raleigh, N. C., and that at Asheville, N. C.—both places in the sam latitude, one on the plains and the other in the mountains—than i the case of any other species. At Raleigh the average date of arriva during fifteen years is March 26, with extremes of March 20 in 189 and April 1 in 1885, 1887, 1891, and 1901. There was also an unusually early migrant seen March 13, 1890. At Asheville the average fo four years is April 21, with extremes of April 13, 1893, and April 26 1894. Eggs have been taken in southeastern Georgia April 24 an fully fledged young in northern Florida early in June.

Fall migration.—An early breeder, the yellow-throated warbler i ready to migrate before the middle of summer. It is the first migran of all the birds to reach Cuba, where it arrives at the end of July an becomes abundant in August. At Key West, Fla., where it does no breed, the arrival of the bird has been noted July 25. Yet there i no record of its striking at the Florida lighthouses before September 13. Gosse records its arrival in Jamaica August 18, and from this early date some writers have thought that it might breed on the island; but in the light of the dates just given it will be seen that Gosse's record corresponds with the migratory movements of the species in Florida and Cuba. As might be expected from the foregoing records, the yellow-throated warbler deserts at an early date its summer home. The last fall bird was reported at Washington September 4, 1890; Asheville, N. C., September 15, 1890; and at Raleigh, N. C., September 17, 1886, September 8, 1888, September 12, 1889, September 10, 1890, and September 4, 1891. Throughout October the birds strike the Florida lighthouses, and even as late as November 7, 1891, one was killed. The time occupied by the species in its fall migration exceeds the entire period extending from the beginning of the spring migration to the date when its early hatched young are fully fledged.

663a. Dendroica dominica albilora Ridgw. Sycamore Warbler.

Breeding range.—The sycamore warbler is the western form of the yellow-throated warbler, and is confined in summer principally to the timbered parts of the central and lower Mississippi Valley. The center of abundance is the lower Ohio Valley. Thence the species ranges less commonly to the northern boundary of the Carolinian life zone in West Virginia, Ohio, southern Michigan, and southern Wisconsin, west to southeastern Nebraska and eastern Kansas, and south to eastern Texas. The eastern range is bounded by the Allegheny Mountains. The bird breeds throughout its range in the United States except the tropical part of the lower Rio Grande Valley of Texas. The area of the summer home of the sycamore warbler is therefore fairly rectangular and is approximately 800 miles north and south by 600 miles east and west.

Winter range.—The sycamore warbler is one of the few species of the eastern United States found farther west in winter than in summer. But the strangest feature of its life history is its wide longitudinal distribution in winter. Its winter home extends from the Pacific coast of Mexico in Tepic,[a] and Colima,[b] to Nicaragua[c] and Costa Rica,[d] a distance of 1,500 miles. It is rare at both these extremes—so rare, indeed, in western Mexico that it was not seen by any of the parties of the Biological Survey, although considerable time was spent in these localities. In winter it is common in southern Vera Cruz, Yucatan, and the Atlantic slope of Guatemala, and less common in Oaxaca and Chiapas. At this season a few birds occur as far north as the lower Rio Grande. During the winter it is commonly an inhabitant of the lower districts and the coasts, occurring for the most part below 4,000 feet; but there are instances, principally in the fall, of birds being seen several thousand feet higher.

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[a] Lawrence, Mem. Bost. Soc. Nat. Hist., II, p. 270, 1874.

[b] Baird, Rev. Am. Birds, I, p. 209, 1865.

[c] Richmond, Proc. U. S. Nat. Mus., XVI, p. 484, 1893.

[d] Zeledon, Anal. Mus. Nac. C. R., p. 106, 1887.

Spring migration.—At New Orleans the sycamore warbler is one of the earliest spring migrants. Dates of arrival are March 11, 1894, March 9, 1895, March 7, 1896, and March 12, 1898. The bird became common by March 16, 1895, March 13, 1897, and March 19, 1898. At Helena, Ark., the first arrivals were noted on April 14, 1895, and April 10, 1897; at St. Louis, April 4, 1884, April 6, 1885, April 12, 1886, April 10, 1887, and April 13, 1888; in central Indiana about the middle of April; in southern Michigan about April 20. A migrant was noted at Soto del Marina, Tamaulipas, March 1, 1902. The following Texas dates of earliest arrival are, as usual, irregular: Hidalgo, March 6, 1894; Rockport, March 16, 1892; Refugio County, March 13, 1899; San Antonio, April 9, 1889, March 31, 1890, April 19, 1891; Kerrville, April 10, 1900, April 1, 1901; Dallas, March 12, 1898, March 12, 1899; Gainesville, April 7, 1884, March 22, 1885, March 31, 1886, April 4, 1887. The latest record of the sycamore warbler in spring south of the United States is April 13, 1901, when it was observed on the northeast coast of Yucatan.

Fall migration.—In the fall the Mississippi Valley form is, like the eastern, an early migrant, being one of the first birds to return in autumn to the Rio Grande of Texas. It is recorded as arriving at Orizaba, Mexico, August 10; Chiapas, Mexico, August 13; Colima, Mexico, in August; Duenas, Guatemala, by the middle of August; Bonacca Island,[a] Honduras, and Truxillo,[b] on the mainland, in September; and at San José, Costa Rica, October 4. In the northern part of its range it lingers somewhat later than the eastern form. The last to pass southward do not leave Indiana and Missouri until well into October.

664. **Dendroica graciæ** Baird. Grace Warbler.

The Grace warbler breeds in the mountains of New Mexico, Arizona, and Chihuahua, Mexico, and retires for the winter into northwestern Mexico. Its northernmost extension is in southern Colorado, where it occurs regularly in La Plata County, breeding to 8,500 feet. It has been taken in north central Colorado and southern California, but its occurrence at these points is accidental. It is found in winter as far south as Tepic and Jalisco. In Arizona spring arrivals have been noted as follows: Fort Whipple, April 24, 1865; Pima Co., April 22, 1885; Huachuca Mountains, April 27, 1902, April 12, 1903.

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[a] Salvin, Ibis, p. 250, 1888.

[b] Ridgway, Proc. U. S. Nat. Mus., X, p. 579, 1888.

365. Dendroica nigrescens (Towns.). Black-throated Gray Warbler.

The black-throated gray warbler is another of the warblers of the western United States. Its breeding range extends from southern California and southern Arizona north to British Columbia and east to central Colorado, and rises to an altitude of 9,500 feet. The species migrates in winter to Mexico and ranges from Oaxaca and Vera Cruz to as far north as Durango, where it was noted by the parties of the Biological Survey.

Spring migration.—The black-throated gray warbler enters southern California in the first week in April and reaches southern British Columbia by the third week in the month. The earliest dates in southern Arizona and southern New Mexico are included between March 31 and April 9, while the species reaches early in May the northern portion of its range in Colorado.

Fall migration.—The last fall migrants of the species do not leave central California until the first week in October, and do not desert the State until after the middle of the month.

366. Dendroica chrysoparia Scl. & Salv. Golden-cheeked Warbler.

This rare species breeds in Texas and retires in winter to Mexico and Guatemala. The winter range is not well known. The known breeding range is a restricted area in south-central Texas north to about latitude 31°. Its arrival near San Antonio, Tex., was noted March 13, 1895, March 10, 1896, March 9, 1897, March 13, 1898, and March 14, 1900—average, March 12.

367. Dendroica virens (Gmel.). Black-throated Green Warbler.

Breeding range.—The black-throated green warbler is one of the most abundant of its family. It breeds commonly from southern New England north to the Gulf of St. Lawrence and Newfoundland and in the mountains of Pennsylvania, the Catskills, northern and western New York, Michigan, northern Illinois, Wisconsin, Minnesota, northern Alberta (Edmonton), and southwestern Athabasca (Peace River Landing). It breeds less commonly southward in the higher Alleghenies to South Carolina. It was taken several times near the outlet of Athabasca Lake by one of the parties of the Biological Survey. The range as described shows that the black-throated green warbler belongs to the Canadian zone and the northern part of the Alleghenian.

Migration range.—Western Assiniboia, western Minnesota, eastern Nebraska, and eastern Kansas mark the western limit of the species in migration. West of the heavy forest area of the Mississippi it is rare. Through eastern Texas it is more common, as this is one of its regular migration routes to southern Texas and eastern Mexico.

Winter range.—The winter home of the species is in heavy, low-lying forests, much lower than would be expected from its summer home. The northernmost point from which it has been recorded i winter is Linares, Nuevo Leon (about 2,000 feet altitude). Thence i ranges through the lower districts of Puebla, Vera Cruz, and Chiapas and eastward to Campeche and Yucatan. The center of abundanc during the winter seems to be from the islands off the east coast o Yucatan through northern Guatemala and the southern half of Ver Cruz. The bird passes south in small numbers to the Pacific coast i southern Oaxaca, and to the mountains along the Pacific side in Guatemala. In Vera Cruz it is abundant from 400 to 2,800 feet and is les common to 3,800 feet. During migration it passes higher and ha been taken at 6,000 feet in Chiapas and up to 8,000 feet in Hidalgo There seems to be no record as yet of its occurrence in Honduras, an but one for Nicaragua.[a] In Costa Rica it is not common, but has bee taken in several places in the mountains from 1,400 to 4,000 feet Judging from the records it occurs less commonly in Panama than i Costa Rica, but it has been taken both in the lowlands of the Atlanti slope and on the mountains of the Pacific.

A few scattering records show that the black-throated green warbler is evidently but an accidental visitant in the West Indies, wher its occurrence has been recorded in Cuba,[b] Isle of Pines,[c] Jamaica, Watlings Island,[e] Dominica,[f] and Guadeloupe.[g] The species is commonly called a winter resident of Cuba, but is never said to winter i Florida; yet the records of its occurrence in winter in the two place are of a similar sort. Gundlach saw a single bird in January, 1854 in western Cuba, and Atkins saw one in January, 1888, at Key West

Spring migration.—The earliest recorded date of arrival of th black-throated green warbler in the eastern part of the United State is March 23, 1885, on which date the bird was noted at Pensacola, Fla The spring records of the species in southern Florida are very few consisting of one at Tarpon Springs, April 1, 1888, and one a Tortugas, April 26, 1890. In northwestern Florida, on the contrary on the direct line from the Alleghenies to Yucatan, the bird is quit common in spring.

In 1885 the earliest date of arrival in Chester County, S. C., recorde by Loomis was March 31, while the first birds seen at Rising Fawn Ga., and Raleigh, N. C., were noted on April 1. The average o earliest spring arrivals for six years at Raleigh is March 30, obtaine from the following very even record of first appearances: April 1

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[a] Nutting, Proc. U. S. Nat. Mus., V, p. 494, 1883.

[b] Gundlach, J. f. Orn., p. 474, 1855.

[c] Cory, Cat. Birds West Indies, p. 118, 1892.

[d] Newton, P. Z. S., p. 552, 1879.

[e] Cory, Auk, IX, p. 49, 1892.

[f] Verrill, Conn. Acad., VIII, p. 350, 1892; Lawrence, Proc. U. S. Nat. Mus., I, p 54, 1878, and p. 486, 1879.

[g] Lawrence, Proc. U. S. Nat. Mus., VIII, p. 622, 1885.

1885, March 27, 1886, March 28, 1888, March 28, 1889, March 27, 1890, and April 2, 1891. Still earlier dates were March 22, 1897, and 1898. These dates seem very early when compared with those of the first arrival of the species at points immediately north and west. The last week in April is considered an early date for the spring appearance of the species at Washington; the earliest dates on which its arrival in the mountains directly west of Raleigh is recorded are April 13, 1899, and April 15, 1893, the average for three years—1890, 1891, and 1894—being April 30; while at Eubank, Ky., a hundred and fifty miles northwest, on the other side of the mountains, April 9, 1891, April 9, 1894, and April 10, 1895, are the earliest recorded dates of arrival. Average dates of arrival, resulting from several years of observation, are: Washington, D. C., and Renovo, Pa., April 26; Beaver, Pa., and Englewood, N. J., April 30; Alfred, N. Y., May 1; Boston, May 1; central Connecticut, May 3; southern New Hampshire, May 3; southern Maine, May 6; Quebec, May 10; central Nova Scotia and St. John, New Brunswick, May 13; North River, Prince Edward Island, May 17. West of the Alleghenies the dates of arrival are approximately the same as farther east, notwithstanding the fact that the eastern birds have considerably farther to travel than the western. Records of average date of arrival are: Brookville, Ind., April 29; Chicago, May 1; southern Michigan and southern Ontario, May 2; Parry Sound district, Ontario, May 6; Ottawa, May 13; southeastern Iowa, May 5; Lanesboro, Minn., May 7. A black-throated green warbler was seen at Aweme, Manitoba, May 13, 1898; Medicine Hat, Assiniboia, May 17, 1894; Edmonton, Alberta, May 15, 1897; and at Athabasca Lake, June 3, 1901.

Spring migration in Texas is rather early, as the bird winters regularly only a little south of the Rio Grande. One very early individual was seen on February 28, 1894, at Hidalgo, but the species was not again noted until several weeks later. The recorded dates of arrival in Texas are as follows: Corpus Christi, March 23, 1878, March 24, 1891; San Antonio, March 13, 1880, March 20, 1887, March 26, 1889, April 1, 1890, March 26, 1891; Austin, April 1, 1890; Dallas, March 16, 1898, March 17, 1899. It will be noticed that there is no regular progression of dates in Texas from the south northward. This is true not only of the present species, but of almost every other bird whose arrival has been noted sufficiently often and at enough different places to permit comparison. Some dates of the last migrants seen in spring in Texas are as follows: San Antonio, May 23, 1890; Kerrville, May 15, 1900; Dallas, May 15, 1898. Considering how far north of Texas the birds breed, these are rather late dates of passage through the State.

Fall migration.—Since the black-throated green warbler is abundant in migration in the southern Alleghenies and equally common in winter in Yucatan, but nevertheless is rare in southern Florida and still rarer in Cuba, it is evident that the bulk of the species fly across the Gulf of Mexico from the mainland of the Gulf States. Records of occurrence during fall migration in southern Florida are, like those of occurrence in spring, very few. The species was observed at Tarpon Springs, October 15, 1886; Key West, October 14, 1887, and at Sombrero Key, November 10, 1888, when two birds struck the light. In North Carolina the early fall migrants commonly appear during the last week in August. At the same latitude in the Mississippi Valley the dates of first appearance in fall are but a few days later. The first birds to reach the Gulf coast arrive about the last of September. An individual was seen at Beauvoir, Miss., July 30, 1897, but this was evidently a bird that had gone astray. The bulk of the species pass through the Gulf States in October. The southern boundary of the summer range is finally abandoned about the first of October, and by the last of the month nearly all the birds have crossed the Gulf. Late migrants are recorded as follows: North River, Prince Edward Island, September 13, 1890; St. John, New Brunswick, September 25, 1891 southern Maine, October 2, 1898; Fitchburg, Mass., October 9, 1898 southeastern New York, October 15, 1887; Germantown, Pa., October 18, 1888; Washington, October 20, 1890; Raleigh, N. C., October 16, 1893; Ottawa, October 8, 1887; Chicago, October 12, 1894; Eubank, Ky., October 14, 1891, and New Orleans, October 28, 1899. The earliest recorded date of fall arrival south of the United States is September 14, 1892, in Morelos, Mexico.[a]

668. **Dendroica townsendi** (Towns.). Townsend Warbler.

The Townsend warbler is one of the widest ranging of the western warblers, breeding from the mountains of southern California north to Sitka, Alaska, and the upper Yukon Valley (lat. 61°) and east to Idaho and western Colorado. In migration it ranges to the eastern foothills of Colorado and to western Texas. It nests up to an altitude of 8,000 feet, and in migration has been noted 2,000 feet higher. It winters from Guerrero and the City of Mexico to Guatemala, being most common near the southern limit of the range, while a few sometimes winter as far north as southern California. It has been found in winter in Guatemala at an altitude of 12,000 feet.

Spring migration.—An early migrating Townsend warbler was seen on April 9 in the Huachuca Mountains of Arizona. Migrants from Mexico begin to enter southern California April 14 to 20. The earliest noted in 1888 at Chilliwack, British Columbia, was on May 19, but the usual date of arrival is probably several days earlier, for the average date of the first seen during five years at Columbia Falls, Mont., is May 7, varying from May 4, 1897, to May 11, 1896. First arrivals ave been reported from Loveland, Colo., May 11, 1889, and from Great Falls, Mont., May 28, 1890.

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[a] Jouy, Proc. U. S. Nat. Mus., XVI, p. 777, 1894.

Fall migration.—No Townsend warblers were seen at Columbia Falls, Mont., after August 17, 1895, nor at Chilliwack, British Columbia, later than September 12, 1888.

369. Dendroica occidentalis (Towns.). Hermit Warbler.

The hermit warbler breeds from the higher mountains of California o southern British Columbia in the Pacific coast district of the nited States. It winters in the pine forests of Mexico and Guatemala at an elevation of 3,500 to 10,000 feet. Early in April it nters the United States, being reported from Oracle, Ariz., April 12, 1899, and the Huachuca Mountains, Arizona, April 9, 1902. Records of the first seen in California are: Campo, April 27, 1877, and Julian, April 25, 1884. A hermit warbler was noted at Burrard nlet, British Columbia, April 20, 1885. In the fall the species has been noted as late as September 22 in Arizona and October 9 in outhern California.

370. Dendroica kirtlandi Baird. Kirtland Warbler.

Breeding range.—The first nests of the Kirtland warbler known to cience were taken in Oscoda and Crawford counties, Mich.[a] Several oung birds and a single egg were secured July 8 to 14, 1903. The ollowing year a nest with five eggs was taken in Roscommon County, Mich.

Winter range.—The records of the distribution and migration of his, the rarest warbler of the eastern part of the United States, have ecently been collected[b] and elaborated. From these data it appears hat the Kirtland warbler is a winter resident of the Bahamas as far south at least as the Caicos group. It has been taken in winter on the Berry and Andros groups, and on Eleuthera, New Providence, Green Cay, Watlings, and Athels islands. It has also been taken on the Abaco group, but only in spring and fall migration.

Spring migration.—The southernmost point in the United States at which occurrence of the Kirtland warbler in spring has been noted is West Jupiter, Fla., just northwest from the Andros and New Providence islands, where migrants from these islands would most naturally each the mainland. Here one was seen April 19, 1897, and another April 27. The next point northward at which the bird has been seen n spring is St. Helena Island, South Carolina, where it was noted on April 27 and May 3. During the first week in May the species is ecorded as occurring at St. Louis, Cincinnati, Glen Ellyn, Ill., and Wabash, Ind., and during the next week at Cleveland and Oberlin,

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[a] Adams, Science, XVIII, p. 217, 1903; Wood, Bul. Mich. Orn. Club., V, pp. –13, 1904.

[b] Chapman, Auk, XV, p. 289, 1898; XVI, p. 81, 1899.

Ohio, Battle Creek, Ann Arbor, and Mackinac, Mich., and Minneapolis, Minn. In addition to the data given by Chapman there are th following records of the late appearance of the species in spring or o its occurrence in summer: Bahamas,[a] March 4 and April 5, 1897; Littl Abaco, Bahamas,[b] March 25, 1902; Nassau, Bahamas,[b] April, 190 Ann Arbor, Mich.,[c] May 14, 1902; Morgan Park, Ill.,[d] May 22, 189 Rockford, Ill.,[e] May 25; Lake Koshkonong, Wis.,[e] May 24; Kalamazoo, Mich.,[e] May 15, 1885; Luzerne, Mich.,[e] June 15; Toronto, Canada,[f] May 16, 1900; Oscoda County, Mich., June 15[g] and July 3,[h] 190

Fall migration.—The only records of occurrence of the Kirtlan warbler in fall in the United States are the following: Fort Myer, Va. September 25, 1887 (Palmer); Chester, S. C., October 11, 188 (Loomis); and Ohio, opposite Ashland, Ky.,[i] August 28, 1902.

671. **Dendroica vigorsii** (Aud.). Pine Warbler.

Breeding range.—The pine warbler breeds throughout the easter part of the United States from Florida and the Gulf States northwar to New Brunswick, Ontario, and Manitoba. One of the northernmost points from which it is recorded is Carlton, Saskatchewan, wher a party of the Biological Survey found it common during July, 189 The northern boundary of the breeding range of the species is in th Canadian life zone, but comparatively few individuals nest north the Alleghenian zone. In the region of the plains, where pine forests are lacking, it is a rather rare migrant. It was secured onc at Revelstoke, British Columbia. Nearer the Mississippi River an thence to the Atlantic Ocean its presence during the breeding season largely governed by the extent of pine timber. Hence in summer is more common in the Southern States and the pitch and white pin districts of southern New England than in the middle hard-wood districts, throughout which, from about latitude 37° northward, it known to most observers as a more or less common migrant and to few as a rather rare summer resident.

Winter range.—The pine warbler is a rare winter resident in easter Texas south to Corpus Christi. From North Carolina and souther Illinois southward it is common in winter in the pines. Occasionall at this season it winters north to Massachusetts. It has not yet bee reported from Cuba or the islands at the south of Florida, nor hav ny specimens been received from the Florida lighthouses. During ebruary, 1902, a pine warbler was taken by one of the parties of the iological Survey at Matamoras, Tamaulipas. This is probably the rst record of its occurrence in Mexico or at any other point outside e United States, except for a casual occurrence in the Bermudas.

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[a] Bangs, Auk, XVII, p. 292, 1900.

[b] Bonhote, Ibis, p. 280, 1903.

[c] Wood, Auk, XIX, p. 291, 1902.

[d] Blackwelder, Auk, XVI, p. 359, 1899.

[e] Adams, Bull. Mich. Orn. Club, V, p. 18, 1904.

[f] Samuel, Auk, XVII, p. 391, 1900.

[g] Frothingham, Bull. Mich. Orn. Club, IV, p. 61, 1903.

[h] Bain, Bull. Mich. Orn. Club, IV, p. 63, 1903.

[i] Jones, Wilson Bulletin, IX, p. 104, 1902.

Spring migration.—The pine warbler is one of the first of the fam- y to migrate in spring. Migrant birds are seen in March over most f the winter range and even to Washington and eastern Pennsylvania. he average date of spring arrival at Boston is April 10, and in south- n New Hampshire April 13. In the Mississippi Valley migration eems to be a few days later than east of the Alleghenies. The species aches St. Louis and central Indiana not much before the middle of pril. Grand Rapids, Mich., is reached, on the average, April 17; hicago, April 21; Ottawa, May 15, and Lanesboro, Minn., April 29.

Fall migration.—Though arriving early in spring, the pine warbler slow to disappear in fall. It starts south sufficiently early, for it aves the northern part of its range by the middle of September. ut it passes latitude 39° as late as the first half of October, and is arcely settled in its winter home before the 1st of November. An nusually late migrant was seen at Ottawa October 10, 1891.

This is one of the few warblers of the eastern United States whose inter home is included in its breeding range. During the winter ason the pine warbler occupies approximately the southern third of e breeding range; hence it is not surprising that the birds are found be more common there in winter than at any other time of the year.

72. **Dendroica palmarum** (Gmel.). Palm Warbler.

Breeding range.—This western form of the species breeds north of Ianitoba and west of Hudson Bay to at least Fort Churchill, Fort esolution, and Fort Simpson. While there appear to be no records s yet of its breeding in Manitoba or Minnesota, it has been seen in hese localities so late in spring and so early in fall that it will prob- bly be found nesting throughout most of the mountainous districts rom northeastern Minnesota northward.

Migration range.—Passing south through the Mississippi Valley e bird is a common migrant on both sides of the Mississippi River. o the west it ranges to eastern Nebraska and eastern Kansas, and it as been noted as accidental in Colorado, Montana, and California. t is less common in Kansas than in Nebraska, for the route mainly raveled turns in the latter State to the east toward Florida. East- ard the species ranges regularly to the Allegheny Mountains, and a w individuals wander each fall to the Atlantic coast, as far north as Vashington, D. C., or occasionally to New England.

Winter range.—The palm warbler is abundant in winter in all the ahamas and in Cuba and Jamaica, and is present, though less common, in Haiti and Porto Rico, which latter island marks the limit of the eastern extension of the species. It also winters in southern Florida. To the south it has been taken on Grand Cayman, Little Cayman,[a] Cayman Brack,[a] the Swan Islands,[b] Cozumel,[c] Ruatan,[d] and Old Providence,[e] but has not as yet been noted on the mainland of Honduras or Nicaragua. Two occurrences on the mainland of Yucatan[f] are recorded, and one of the parties of the Biological Survey found the species not uncommon on Cozumel Island, more common on Mujeres Island, and very common during March and April, 1901, on the mainland of Yucatan, at La Vega.

Spring migration.—It is impossible to separate the records of occurrence of the two forms of this species during spring migration in the Gulf States, with the exception of those made at the lighthouses of southern Florida. Here the earliest individuals of the western form to strike the lights were noted on April 4, 1886, March 23, 1887, March 10 and 11, 1888, and March 3, 11, 23, and 24, 1889. Palm warblers were among the most numerous in the clouds of small birds that swarmed around the lights on the night of March 3, 1889. They were reported on the same night from both Sombrero Key and Fowey Rocks—one of the few instances in which a species has been so reported from the two points. The next certain records of the occurrence the western form were made at St. Louis, where it was noted April 1 1883, April 18, 1884, April 13, 1887, and April 17, 1888. These d correspond closely with those on which the species has been obse in central Indiana—April 17 to 21. Records of average d arrival farther north are: Chicago, April 25; southern Mich 1; southern Ontario, May 2; southern Wisconsin, April 30; Iowa, April 22; Lanesboro, Minn., April 30; Elk River, Mi 3; Aweme, Manitoba, May 7. A specimen was taken at Fo pewyan, Athabasca, May 23, 1901. The fact that the bul western form winter farther south than does *hypochrysea* of is reflected by the lateness of spring migration in the Mississ ley, as compared with the earliness of the northward move the Atlantic coast. By the time *palmarum* has arrived at *hypochrysea* has reached New England. The last palm w pass northward in spring have been noted at St. Louis 1884, May 12, 1885, and May 10, 1887, and in central Indi the middle of May. These dates probably mark the norma of the later migrants of this species. In the South the dates on which the species was last seen in spring are quite variable. It was last noted in Florida: Palatka, April 12, 1885; Tarpon Springs, April 18; Gainesville, April 29, 1887; Tortugas, April 26, 1890; Sombrero Key lighthouse, April 25, 1887, and May 15, 1888. Other last dates are: New Providence, Bahamas, April 30; Andros Island, Bahamas, May 2, 1890; Jamaica, April 6; Cozumel Island, Yucatan, April 18, 1901; and Porto Rico, April 8, 1900.

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[a] Cory, Auk, VI, p. 31, 1889.

[b] Ridgway, Proc. U. S. Nat. Mus., X, p. 575, 1888.

[c] Ridgway, Proc. U. S. Nat. Mus., VIII, p. 564, 1885.

[d] Salvin, Ibis, p. 251, 1888.

[e] Cory, Auk, IV, p. 180, 1887.

[f] Boucard, P. Z. S., p. 441, 1883. Stone, Proc. Acad. Nat. Sci., Phila., p. 21 1890.

Fall migration.—The fall migration of this species and that of its eastern representative *hypochrysea* are especially interesting on account of a unique feature that characterizes them, viz, the general line of migration of one form is at right angles with that of the other, the two intersecting in the vicinity of northern Florida. It is possible that *palmarum* has but one general line of migration, which passes in a southeasterly direction from the central Mississippi Valley to Florida, the Bahamas, and the Greater Antilles, and that the individuals noted in Yucatan and the neighboring islands have crossed from southern Cuba, where this species is one of the commonest of North American birds. The records of the Florida lighthouses do ot show such numerous occurrences of *palmarum* as one might expect rom the abundance of the bird in Cuba. The earliest dates in fall on hich this species struck the lights—September 22, 1885, and Septem- 21, 1886—are quite early as compared with the first dates on which ants were noted farther north. In northwestern Minnesota the ll migrants were noted September 9, 1896; at Lanesboro, Minn., er 17, 1888; Keokuk, Iowa, September 11, 1893, and Chi- ember 4, 1900. The earliest dates in Indiana range from r 10, 1892, to September 14, 1897. Loomis says that the s abundant at Chester, S. C., in fall migration, arriving in d week of September, and Scott records the date of first Tarpon Springs as September 22. The earliest date in the f New Orleans is September 25, 1899. These dates indicate rapid migration in fall. The last stragglers of *palmarum* ave Manitoba the last week in September; Lanesboro, Minn., eek in October; Chicago about October 9, and the central Valley by the middle of the month; but migrants continue Cuba for a month longer. The latest dates of striking the s are November 19, 1886, November 11, 1888, and Novem- 391.

Dendroica palmarum hypochrysea Ridgw. Yellow Palm Warbler.

eding range.—Hudson Bay is supposed to be the dividing line ween the summer home of the western palm warbler and that of e eastern form *hypochrysea*. The eastern bird breeds from eastern aine, New Brunswick, and Nova Scotia northward, east of Hudson

Bay. The northern limit of its range is not yet clearly determined but is probably in Quebec, southern Labrador, and Newfoundland.

Winter range.—From this restricted breeding ground *hypochryse* comes southwest, following a narrow belt along the Atlantic coast and winters on the north coast of the Gulf of Mexico. The winte range extends from Louisiana to northern Florida, and occasionally a far north as eastern North Carolina. Accidental visitants have bee taken in Cuba and Jamaica. In central Alabama *palmarum* appears a a fall migrant and passes on to the southeast, its place being taken b *hypochrysea* as a common winter resident. Early in the spring *hypochrysea* leaves for the northeast, and later *palmarum* passes throug toward the Mississippi Valley. Chapman found a few specimens o *hypochrysea* as far south as Gainesville, Fla., and noted the departur of the last northward migrant March 15, 1887, six weeks before *palmarum* finally disappeared.

Spring migration.—Migrants appear on the average at Washingto April 6; Philadelphia, April 14; central Connecticut, April 15; Boston April 18; St. John, New Brunswick, April 20; Halifax, Nova Scotia April 27, and Pictou, Nova Scotia, May 1, showing that *hypochryse* is one of the earliest of migrating warblers and that it endures sever weather with impunity. At Raleigh, N. C., the bird is a rare winte visitant. The last to leave for the North was noted April 20, 188 April 16, 1889, April 14, 1890, and May 1, 1893. The latest sprin migrant noted at Washington passed through on April 29. Hence may be assumed that palm warblers that were reported as departin from Asheville, N. C., on May 12, 1890, and May 15, 1894, were the form *palmarum*, which has been taken at Washington as late May 18.

Fall migration.—Yellow palm warblers are expected to reappear southern Maine soon after the middle of September, and to pass on New Jersey and Washington about the 1st of October. An unus ally early fall migrant was seen at Beaver, Pa., September 7, 188 In 1887 the species was not noted at North River, Prince Edwa Island, after September 15, but at St. John, New Brunswick, the ave age date of the last recorded is about October 13. New England a the districts north of the winter home are occupied until about Octob 20, and the bird is sometimes seen in Massachusetts as late as ear November. A specimen was taken near New York City Novemb 15, 1898.

673. Dendroica discolor (Vieill.). Prairie Warbler.

Breeding range.—The prairie warbler is quite local in its distrib tion. Along the Atlantic coast it breeds from the northern Bahan and Florida to Massachusetts, but north of Philadelphia is found, a rule, only near the coast. Farther south it is common locally fr sea level to about an altitude of a thousand feet. The highest point at which it has been recorded is Old Fort in western North Carolina at about fifteen hundred feet. From northwestern Georgia, through Tennessee, Kentucky, Ohio, and western Pennsylvania, it ranges up to a thousand feet elevation. Throughout most of the Mississippi Valley the prairie warbler is rare. This is especially noticeable in Illinois and Indiana, where so many other warblers are common. It breeds locally but not uncommonly in southern and central Michigan and southern Ontario—rarely or accidentally in southeastern Wisconsin—and westward in southern Iowa, eastern Nebraska, and eastern Kansas. In the three States last mentioned its breeding range has been traced up to just a thousand feet elevation. In Nebraska it has been noted, in migration, as high as 1,300 feet at Westpoint. In outhwestern Missouri it breeds at Pierce City (1,300 feet), which is he farthest point to the southwest at which it occurs regularly. The pecies is not uncommon locally in northern Mississippi, and was once eported from the coast at Beauvoir; it has also been recorded once rom Louisiana and once from Texas.

The prairie warbler is principally a bird of the Carolinian zone, hough a few breed in the Alleghenian of central Michigan and westrn Pennsylvania. In parts of Connecticut and Rhode Island it is ommon locally, as it is also in eastern Massachusetts, where it is charcteristic of the barberry districts. In the Austroriparian zone of the outh Atlantic and Gulf States a few of the species breed. The bird s, however, rare in the Gulf strip of the Austroriparian zone.

Winter range.—The western boundary of regular westward distribution of the prairie warbler runs southeast from eastern Kansas hrough central Alabama to Florida. The winter home of the species ncludes all the Bahamas and the Greater Antilles. Few birds have a ider distribution in the West Indies. The species is recorded in all he larger and in 26 of the smaller islands. In the Lesser Antilles it anges to St. Eustatius[a] and St. Christopher,[b] where it was found in he spring and fall of 1890. To the south of Cuba it has been taken n Little Cayman[c] and Cayman Brack;[c] on the Swan Islands half way o Yucatan; on Mujeres[d] and Cozumel Islands[e] off the coast of Yuca- an, and on the island of Bonacca[d] near the north coast of Honduras he southernmost point from which it is reported). The northern limit f the winter range is about the center of Florida, a little farther orth than the bird reaches in the Bahamas.

Spring migration.—The records of spring migration of the prairie arbler in Florida are indefinite, owing to the fact that the bird inters in the southern part of the State. Some unusually early

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[a] Cory, Auk, VIII, p. 47, 1891.

[b] Cory, Auk, VIII, p. 48, 1891.

[c] Cory, Auk, VI, p. 31, 1889.

[d] Salvin, Ibis, p. 250, 1888.

[e] Ridgway, Proc. U. S. Nat. Mus. VIII, p. 564, 1885.

records of migrants to the northward are March 5, 1888, Marc
1889, and February 19, 1891, at Frogmore, S. C. The full tid
migration, however, does not start until the last of March. Th
there are records of single birds striking as early as March
Sombrero Key lighthouse, no large flights occur until the last
in the month. During the first week in April the species cr
northern Florida and Georgia, arriving the following week in ce
North Carolina. The average date of earliest arrivals for si
years at Raleigh, N. C., is April 15, with extremes of April 6,
and April 22, 1886. In the northwestern extremity of Georgi
Rising Fawn, the bird was seen April 5, 1885. At Eubank, Ky., o
other side of the mountains, the seven years' average of earliest ar
is April 20, with extremes of April 13, 1893, and April 22, 1889.
earliest migrants usually arrive at Washington April 22; in so
eastern New York May 4; at Portland, Conn., May 6, and at Bo
May 8. One was taken at Toronto, May 11, 1900, probably the
record of the species for Canada. Thus the northern part of the b
ing range is reached by the first week in May, at which time an
a week longer migrants are still crossing from Cuba to Flo
According to the records, Haiti is finally abandoned April 1, Ja
April 11, and the southern Bahamas April 12. Some late mig
struck the Cay Lobos lighthouse, off the north coast of Cuba, M
1900, and May 13, 1901.

Fall migration.—The time when the prairie warbler begins its s
ward journey can be judged from the fact that migrants have
noted by August 18 at New Providence, Bahamas, and on the i
of Jamaica. Throughout the Bahamas and in Cuba this species i
of the most abundant winter birds; hence it must be a common mi
through Florida. But no such numbers of the species are kille
striking the lighthouses as of several other species apparently no
common. The prairie warbler is recorded as striking on sixt
different nights, more than two-thirds of which were in the fall.
Sombrero Key, where an exact count was kept of the number of
species striking and killed, just half of the fall records of this sp
are of but 1 bird per night. Six in a night was the largest nu
attained, except on October 2, 3, and 4, 1888, when the light was st
by 20, 47, and 7 birds respectively. The keeper at the Alligator
light reports that 15 prairie warblers struck his light on Septe
28, 1889.

The prairie warbler leaves its northern breeding grounds ea
September, and few of the birds are seen along the central Atl
coast later than this date. The five years' record of the latest
on which fall migrants were seen at Raleigh, N. C., gives an av
of September 6, with extremes of September 3 and 9. At Frog
S. C., the reported dates of the end of fall migration are Septe

25, 1885, September 30, 1886, and September 20, 1887. The earliest recorded dates on which the Sombrero Key lighthouse was struck by southward migrants are August 22 and 23, 1889; but the bulk of the birds pass by after September 16, and the larger flights occur during the ten days from September 29 to October 9. The regular migration may be considered closed by the middle of October, the only dates later than this on which migrants were observed being November 4, 1888, at Sombrero Key, and November 6, 1891, at Fowey Rocks. Since the regular spring migration begins about the 1st of March, the prairie warbler spends at least five months in its winter home, and many individuals remain a month longer.

674. Seiurus aurocapillus (Linn.). Oven-bird.

Breeding range.—The oven-bird breeds from Kansas and Virginia north to Alaska, Hudson Bay, the Gulf of St. Lawrence, and Newfoundland, and south in the Alleghenies to South Carolina. It ranges west to Colorado and Montana, and accidentally to British Columbia. A few of the species breed in the northern Bahamas.

Winter range.—The winter range of the oven-bird covers a wide range of longitude, from the Pacific coast of Mexico at Mazatlan to Colombia, South America. It is strange that the species should occur at Mazatlan, as it is a bird of the eastern United States, with but scattering records west of Kansas. It is seldom that a Mississippi Valley bird goes into western Mexico, for the general direction of migration is south and southeast. United States birds that winter in western Mexico usually come from California and the Pacific coast region. But the oven-bird, which was originally reported by Grayson[a] as occurring from November to April at Mazatlan, was found in March and April, 1899, in that vicinity by one of the parties of the Biological Survey.

In eastern Mexico the oven-bird winters from Monterey, Nuevo Leon, to eastern Oaxaca, being rare in both these places, but common long the coast of Tabasco and abundant in Yucatan. It has been eported in Mexico at as high elevation as 4,000 feet, but, with the xception of a few noted at Monterey, all the individuals seen by the arties of the Biological Survey were at less than a thousand feet altiude. The species is common in the lower parts of Guatemala and anges in smaller numbers to nearly 5,000 feet. It has been taken in Honduras at Omoa and on the islands of Ruatan[b] and Bonacca,[b] on the orth coast. In Nicaragua a few individuals have been seen at Lake icaragua,[c] on the southeastern coast,[d] and at Greytown.[e] In Costa

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[a] Lawrence, Mem. Bos. Soc. Nat. Hist. II, p. 269, 1874.

[b] Salvin, Ibis, p. 251, 1888.

[c] Nutting, Proc. U. S. Nat. Mus., VI, p. 381, 1883.

[d] Richmond, Proc. U. S. Nat. Mus., XVI, p. 484, 1893.

[e] Lawrence, Am. Lyc. Nat. Hist., VIII, p. 179, 1865.

Rica it has been noted several times, but in only one instance has been reported as common—at Miravalles,[a] on the northwest coast, 1,400–2,000 feet. At San José[b] (3,500 feet) it is quite rare. Th southernmost points at which its occurrence is recorded are the volca of Chiriqui[c] in Panama, and Bonda[d] on the coast of northern Colombi

The range of the oven-bird in the West Indies is extensive; includes the larger islands and extends to St. Croix and St. Thomas the Lesser Antilles. The bird is found throughout the Bahama there are records of its occurrence on twelve different islands, and winters in quite large numbers at least as far north as Andros a New Providence. It is abundant in winter in southern Florida a is less common thence to the central part of the State. On Janua 21, 1903, an individual was seen at Whitfield in northern Florida. few of the species sometimes spend the winter on the islands off t coast of Louisiana.[e]

Spring migration.—In the records of the occurrence of the ove bird in spring in Florida migrants and wintering birds are indi tinguishably confused, excepting, of course, in the case of tho received from the light-houses.

At Raleigh, N. C., the Brimley brothers spent a great deal of tin and care in obtaining exact records of arrival and departure of bird Their records for the different years are, so far as most species a concerned, surprisingly uniform, varying in a long series of yea only three or four days from the average. In the case of the arriv in spring of the oven-bird, however, there are not only variatio from year to year, but quite large differences in the averages of fiv year periods. These five-year averages are as follows: 1885–18 average, April 18; 1890–1894 average, April 12; 1896–1900 averag April 22. The extremes are April 7, 1892, and April 29, 1899. It probable that variations in the winters, which drive the birds south allow them to remain even as far north as St. Augustine, may accou for this irregularity. The average date of arrival at Raleigh is pro ably April 12–15, while at Asheville, N. C., in the mountains, it April 18.

The oven-bird, called in southern Florida and the Bahamas t "night-walker," is one of the birds which strike most commo against the Florida lighthouses. The records of its striking a voluminous, but can not be used with perfect confidence because the uncertainty whether the species has been in all cases clearly d tinguished from other members of the genus. The earliest unqu ionable date of striking is April 6, 1887, at Sombrero Key. The arliest date on which spring migrants were noted on the mainland is larch 26, 1885, at Pensacola. Records of average date of arrival orth of Raleigh are: Variety Mills, Va., White Sulphur Springs and renchcreek, W. Va., and Washington, D. C., April 24–26; Beaver, a., April 28; Berwyn, Pa., May 1; southeastern New York, May 2; entral New York, May 4; northeastern New York, May 8; central onnecticut, May 3; Boston, May 5; St. Johnsbury, Vt., May 9; outhern New Hampshire, May 7; southern Maine, May 10; Montreal, lay 13; southern New Brunswick, May 20; central Nova Scotia, May 3. In 1887 the oven-bird was noted at North River, Prince Edward sland, May 19, and at Godbout, Quebec, June 2.

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[a] Underwood, Ibis, p. 434, 1896.

[b] Cherrie, Auk, IX, p. 21, 1892.

[c] Salvin, P. Z. S., p. 183, 1870; Bangs, Auk, XVIII, p. 368, 1901; Bangs, Proc E. Zool. Club, III, p. 62, 1902.

[d] Specimen in Carnegie Museum, Pittsburg, Pa.

[e] Beyer, The Avifauna of Louisiana, p. 40, 1900.

Spring migration of oven-birds in the Mississippi Valley is decidedly arlier than in the same latitudes farther east. The average date of arliest arrivals for ten years at Eubank, Ky., is April 10, with extremes f April 3, 1888, and April 17, 1895. The average for four years at t. Louis is April 14. No records of first arrival at New Orleans orrespond to these dates made farther to the north. The earliest ates at New Orleans are April 2, 1881, April 6, 1895, and April 7, 900. The first of the species appear at Brookville, Ind., April 23; Vaterloo, Ind., April 27; Petersburg, Mich., April 27; southern ntario, May 4; Parry Sound district, Ontario, May 12; Ottawa, May 6; Chicago and southern Wisconsin, May 1; Keokuk, Iowa, April ; Lanesboro, Minn., May 6; Elk River, Minn., May 7; Medicine at, Assiniboia, May 17, 1894; Edmonton, Alberta, May 14, 1897; weme, Manitoba, May 14. Far to the northwest the first oven-bird as seen at Little Cascade Rapid, Athabasca, May 26, 1903; Athabasca ake May 29, 1901; and at Nulato, Alaska, May 30, 1867. The rarity the oven-bird in Texas proves conclusively that the numbers which ake the species fairly common in eastern Kansas and Nebraska do t pass through the State. Indeed, it is so decidedly a bird of woods d forest that it seems to find few suitable places in the whole country tween Alta Mira, Tamaulipas, and the Sabine River. The earliest cord of spring arrival in Texas is April 7, 1890 (San Antonio), a te when the Mississippi Valley birds have already arrived at the outh of the Ohio. The following records show approximately when e last of the species leave their winter home: St. Croix, in April; osta Rica, April 16, 1864; Jamaica, April 20; Haiti, April 19, 1895; ozumel, April 18, 1901; Mazatlan, April 12, 1899; Cuba, end of pril; and Andros Island, first week in May. The latest recorded dates striking at Cay Lobos lighthouse off the north coast of Cuba are y 17, 1900, and May 13, 1901; and the latest at Sombrero Key light, orida, May 19, 1887, May 15, 1888, and May 29, 1889.

Fall migration.—Early in August migrating oven-birds are seen t south of their breeding range. The earliest recorded date of a l migrant at Raleigh, N. C., is August 9, 1892; in Chester County,

S. C., August 7; at Key West, Fla., August 19, 1889; at Rockport Tex., August 13, 1892; in Cuba and Porto Rico, the end of August and at San José, Costa Rica, August. The bulk of the species mov over this route about a month later and the birds are at times ver numerous. From the middle of September to the middle of Octobe great numbers strike the Florida lighthouses. The keeper of th lighthouse at Fowey Rocks writes: "On the nights of October 10 an 11, 1891, I could have filled a mail bag with oven-birds and a few othe birds."

Some records of final departure are: Aweme, Manitoba, Septembe 23, 1899; Ottawa, September 29, 1900; North River, Prince Edwar Island, September 2, 1888; St. John, New Brunswick, September 29 1891; Chicago, September 30, 1898; Waterloo, Ind., October 7, 1887 Englewood, N. J., October 7, 1886; Philadelphia, October 9, 1887 Washington, October 17, 1890; St. Louis, September 29, 1885; Eubank Ky., October 27, 1886; Raleigh, N. C., October 23, 1885; Ashevill N. C., October 5, 1891; Chester County, S. C., October 29; Ariel Miss., October 19, 1897, and Sombrero Key lighthouse, November 11 1888.

675. **Seiurus noveboracensis** (Gmel.) Water-Thrush.

Breeding range.—The notes on the migrations of the two forms o the water-thrush (*Seiurus noveboracensis* and *S. n. notabilis*) are s mixed that it is impossible to say to which bird a great many of the refer. While the two birds are separated during the breeding season their winter ranges overlap. In general it can be said that in summe the eastern form (*noveboracensis*) occupies the district east of th Mississippi River, breeding from northern Illinois, northern Ne England, and the mountains of Pennsylvania and West Virginia t Hudson Bay, Labrador, and Newfoundland.

Winter range.—Both forms of the water-thrush pass southward i winter to South America; hence, except when specimens are taken, can not be told which of the two forms is actually observed. In th West Indies the eastern water-thrush is one of the widest-rangin species. It is abundant in winter at least as far north as New Prov dence[a] and the larger islands and southeast to St. Croix and St. Thoma It is less common to the southeast where it has been taken at Antigu Guadeloupe,[b] Dominica, Grenada,[c] St. Lucia,[d] Barbados,[e] Carriacou Tobago,[g] and Trinidad.[h] These last-mentioned islands complete th course from the United States through the Bahamas and the Leewa and Windward Islands to South America, and make it possible for t water-thrushes that winter in British Guiana to reach their destination ither eastward along the coast of the mainland or southward by way of the islands.

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[a] Bonhote, Ibis, p. 510, 1899.

[b] Cory, Auk, VIII, p. 49, 1891.

[c] Wells, Proc. U. S. Nat. Mus., IX, p. 611, 1886.

[d] Allen, B. N. O. C., VI, p. 128, 1881.

[e] Feilden, Ibis, p. 482, 1889.

[f] Wells, Auk, XIX, p. 348, 1902.

[g] Salvin, Cat. Strick. Coll., p. 87, 18

[h] Chapman, Bul. Am. Mus. Nat. His VI, p. 24, 1894.

The West Indian records of the water-thrush unquestionably relate o the eastern bird, but on the mainland from Mexico to South Amer-ca the two forms occur together in winter. Hence it is not certain hat all of the following records relate to the eastern bird to which hey are ascribed. This form appears to have been taken in winter y the parties of the Biological Survey near the City of Mexico and in pring in Vera Cruz, and also in spring by Chapman at Las Vigas 8,000 feet), in Vera Cruz. During the spring of 1902 the species was een from April 20 to May 3 in northern Coahuila. It is common in ucatan along the east coast and the neighboring islands, but most of the ecords are made during the spring, when the water-thrush is a very ommon migrant in the State. It occurs throughout Guatemala to an levation of nearly 6,000 feet; on both coasts of Nicaragua; on both oasts of Costa Rica, and also in the interior to at least 4,000 feet, hough not common at this altitude, and on both coasts and in the ower mountains of Panama. Judging from the records, the bird is ommon in the northern half of Colombia,[a] being taken in fall migra-on on the northern coast and during the winter in the interior as far uth as Minca,[b] Medellin,[c] and Bucaramanga.[d] It seems to be most ommon from 2,000 to 6,000 feet. Its range extends still farther east northern South America to Venezuela[e] and British Guiana, where has been taken on the coast at Caracas[f] and Bartica Grove,[g] and in e interior on Mount Roraima.[h] It is abundant in the valleys of the rinoco and Caura rivers,[i] as attested by many specimens taken tween October 21 and March 24.

Spring migration.—The results of the few attempts made to sep-ate the migration records of the two forms of the water-thrush in e United States would seem to indicate that the western form grates in spring earlier than the eastern, and that birds which some-nes winter in Florida as far north as St. Augustine are from the West.

Bangs, Proc. Biol. Soc. Wash., XIII, p. 105, 1899; Allen, Bul. Am. Mus. Nat. st., XIII, p. 177, 1900; Auk, XVII, p. 366, 1900; Cassin, Proc. Acad. Nat. Sci. il., XII, 191, 1860.

Salvin and Godman, Ibis, p. 117, 1880.

Sclater and Salvin, P. Z. S., p. 493, 1879; Sharpe, Cat. Birds Brit. Mus., X, pp. , 653, 1885.

Berlepsch, J. f. Orn., p. 282, 1884; Wyatt, Ibis, 322, 1871.

Sclater and Salvin, P. Z. S., p. 251, 1869; p. 627, 1868; Cabanis, Mus. Hein., . 16, 1850.

Cabanis, Schomb. Guiana, III, p. 666, 1848.

Quelch, Timehri, p. 262, 1896.

Salvin, Ibis, p. 202, 1885.

Berlepsch and Hartert, Novit. Zool., IX, p. 10, 1902.

Usually but few eastern water-thrushes remain in winter in any part of the United States. Moreover, their dates of migration are so late as to indicate a journey from a far southern land. In addition to the difficulty of separating the eastern and western forms, there is the added trouble that a large number of southern observers do not discriminate with certainty between these forms and *S. motacilla*. As a result there is a small residuum of available notes. There is no series of unquestionable records south of Raleigh, N. C., where the average date of arrival for six years is April 25, with extremes of April 20, 1889, and April 29, 1891. From this we may infer that the birds reach the latitude of southern Florida by the first week in April. The Raleigh birds are certainly the eastern form, and those observed at St. Louis as surely the western; yet the five years' average of the dates of first appearance at St. Louis is April 27. This indicates that althoughthe western form is in advance, the difference is so slight that from a mixed lot of data it would not be safe to assign early dates to the western form and late to the eastern. To the northward average records of arrival are: Washington, April 30; Philadelphia, May 6; central Connecticut, May 4; Boston, May 8; southern Maine, May 10; central New Brunswick, May 14. West of the Alleghenies, Waterloo, Ind., is reached April 26; Listowel, Ontario, April 28; the Parry Sound district of Ontario, May 5, and Ottawa, Ontario, May 12.

Although the southern breeding range of the water-thrush is in the Canadian life zone, some individuals are very late in leaving their winter quarters. The species has been taken at Minca, Colombia, March 17, 1879; Concepcion, Colombia, March 17, 1899; San José, Costa Rica, May 21, 1889; southeastern Nicaragua, May 5, 1892; Yucatan, April 22, 1901; San Andres Tuxtla, Vera Cruz (1,500 to 3,000 feet), May 11–13, 1894; Las Vigas, Vera Cruz (8,000 feet), April 26, 1897; Cay Lobos lighthouse, May 2 and 17, 1900; Cay Sal, Bahamas, May 14–19, 1891; Tortugas, May 2, 1890; Raleigh, N. C., May 28, 1887, May 23, 1891.

This species and *S. motacilla* have struck the Florida lighthouses on many nights, sometimes in enormous numbers, but they can not be distinguished in the records.

Fall migration.—The water-thrush is the earliest fall migrant of the warblers whose southern breeding range is in the Canadian life zone, and which do not breed in the southern Allegheny Mountains. It has been noted as early as July 15 at Worcester, Mass., and by the last of the month at Ossining, N. Y., and Washington, D. C.; also in late July and early August at Raleigh, N. C. The first to strike Fire Island light, Long Island, in 1892 was noted August 14. Early fall migrants arrived at Raleigh August 17, 1885, August 17, 1887, August 2, 1888, July 29, 1892, August 7, 1894, August 5, 1898, and August

8, 1899. At Key West, Fla., the first southbound migrant of the year was noted August 16, 1889. One was taken on August 28, 1858, in Jamaica, where Gosse says the earliest fall migrants arrive at the end of August, immediately after which the species becomes abundant. Some early records of fall occurrence are: Mona Island[a] east of Porto Rico, August 18, 1901; southeastern Nicaragua, September 20, 1892; San José, Costa Rica, September 14, 1889; Escazu,[b] Costa Rica, August 13, 1902; Bonda, Colombia, September 8, 1898; Caracas, Venezuela, October 20. Here appears to be strong evidence that these earliest arrivals follow comparatively straight lines of migration from the United States. The birds found at Bonda, for instance, probably did not come from the west by way of Central America and Yucatan, but took a straight flight from some of the West Indies to the coast of South America.

The following records show how late in the fall some water-thrushes linger: Durham, N. H., September 26, 1899; Portland, Conn., October 3, 1894; Ossining, N. Y., October 3; Renovo, Pa., October 5, 1902; Germantown, Pa., October 17, 1885; Raleigh, N. C., October 1, 1887 and 1891.

675a. **Seiurus noveboracensis notabilis** (Ridgw.). Grinnell Water-Thrush.

This name is given in general to the water-thrushes of western North America that breed from Minnesota and Nebraska to Alaska, but the subspecies is not strictly confined to this region. In migration it passes to the Atlantic coast, sometimes, though rarely, as far north as Washington, D. C., and New Jersey. It is more common southward, until in South Carolina both forms are commonly found. Among the few certain records of the occurrence of the subspecies south of the United States are those made at Tapana, Oaxaca, April, 1869; Ceiba,[c] January, and Yaruca,[c] February, 1902, both in Honduras; on both coasts of Nicaragua, and at Chirua,[d] Colombia, at 7,000 feet.

Spring migration.—It is probable that the following records of average date of spring arrival of the water-thrush refer chiefly to the western form: St. Louis, April 27; Chicago, May 2; Keokuk, Iowa, May 3; Lanesboro, Minn., May 5; Minneapolis, Minn., May 6; northwestern Minnesota, May 9; Aweme, Manitoba, May 15. The early migrants travel so fast that by May 16, 1901, they were noted near Lake Athabasca, and they arrived at Fort Simpson, Mackenzie, May 22, 1860, May 20, 1861, and May 14, 1904. Migration in the Rocky Mountains is much later. The birds scarcely reach northern Colorado before the second week in May, and the average date of arrival during five years at Columbia Falls, Mont., is May 20, the earliest being May 18, 1895. The first migrants were noted at Red Deer, Alberta, May 27, 1892, and May 29, 1893, and at Edmonton, Alberta, May 15, 1897.

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[a] Bowdish, Auk, XX, p. 19, 1903.

[b] Specimen in the Carnegie Museum, Pittsburg, Pa.

[c] Bangs, Bul. Mus. Comp. Zool., XXXIX, p. 153, 1903.

[d] Bangs, Proc. Biol. Soc. Wash., XIII, p. 105, 1899.

676. **Seiurus motacilla** (Vieill.). Louisiana Water-Thrush.

Breeding range.—The Louisiana water-thrush breeds throughout its range in the United States, and is one of the characteristic species of the Carolinian life zone, in which it nests just to the northern limit in southern New England, southern Ontario, southern Michigan, and southern Minnesota. Thus the breeding ranges of *S. noveboracensis* and *S. motacilla* are largely separated by the Alleghenian life zone.

Winter range.—The winter range of this species is much the same as that of the last, except that it extends somewhat more to the west. The bird exhibits the rather rare habit of a migration from the Mississippi Valley to the western coast of Mexico—that is, a distinctly southwestern migration through Mexico. Ranging only to eastern Nebraska, eastern Kansas, and quite sparingly to eastern Texas, it yet was found by the parties of the Biological Survey in Durango and Guerrero, and it has been reported as not rare at Mazatlan and Colima. A few individuals winter from the coast to an altitude of 3,500 feet as far north as Chacala, Durango, and Monterey, Nuevo Leon.

The Louisiana water-thrush is found in winter throughout Guatemala from the Pacific coast to 5,000 feet and in migration a thousand feet higher. It is rare or wanting in Campeche and Yucatan, and probably occurs there only in migration. The ranges of the two water-thrushes in Honduras, Nicaragua, Costa Rica, and Panama are much the same, but *motacilla* is much less common than *noveboracensis*. The known range of *motacilla* was extended to the mainland of South America by the taking of a specimen during the winter of 1897–98 on the coast of Santa Marta, Colombia,[a] and another, on November 8, 1898, in the same vicinity at Bonda.[b]

The species is not common in the West Indies, and is somewhat restricted in its range as compared with the rest of the genus. It occurs in Cuba, Haiti, Porto Rico, Jamaica, Grand Cayman, Old Providence, the northern Bahamas, New Providence, Berry, and Bimini Islands. It is recorded from Antigua of the Lesser Antilles, but not from any of the neighboring islands.

Spring migration.—Migration records of the Louisiana water-thrush are practically wanting for Florida and the Gulf coast. There is, however, a most excellent set of records from North Carolina, which show very uniform times of arrival without regard to altitude. The following table gives dates of earliest arrival in spring at Raleigh,

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[a] Bangs, Proc. Biol. Soc. Wash., XII, p. 143, 1898.

[b] Allen, Bull. Am. Mus. Nat. Hist., XIII, p. 177, 1900; Auk, XVII, p. 366, 1900.

Statesville, and Asheville, and with them similar records from Eubank, Ky., just across the mountains (to the northwest) from Asheville:

Record of spring arrivals of Louisiana water-thrush.

Year.	Raleigh.	Statesville.	Asheville.	Eubank, Ky.
1885	Apr. 4	Mar. 27		
1886	Mar. 27			Mar. 28
1887	Mar. 26	Mar. 28		Mar. 27
1888	Mar. 28	Mar. 24		Mar. 24
1889	Mar. 26			Mar. 24
1890	Mar. 29		Apr. 4	Mar. 25
1891			Mar. 25	Mar. 27
1892	Apr. 1		Mar. 26	Mar. 25
1893	Apr. 3		Mar. 30	Mar. 29
1894			Mar. 25	Mar. 30
Average	Mar. 30	Mar. 26	Mar. 28	Mar. 27

The following dates of earliest arrival in spring are more or less in agreement with the foregoing: Gainesville, Fla., March 8, 1887; Greensboro, Ala., April 5, 1888; Shelby, Ala., April 4, 1898; Rising Fawn, Ga., March 28, 1885; New Orleans, April 2, 1898. Northern records of average date of arrival are: Frenchcreek, W. Va., April 3; Washington, April 11; Beaver, Pa., April 14; Scarboro, N. Y., April 19; Portland, Conn., April 17. Migration up the Mississippi River and westward is not much different from that in corresponding eastern latitudes. At St. Louis the average date of arrival is April 8; at Brookville, Ind., April 16; Petersburg, Mich., April 17, and Lanesboro, Minn., April 22. The dates of first arrival at Manhattan, Kans., are April 18, 1884, and April 15, 1885; at Onaga, Kans., April 12, 1891; April 15, 1892, and April 16, 1893. In Texas the species arrived at the Rio Grande on March 31, 1877; in Refugio County, March 17, 1899; at Corpus Christi, March 17, 1899; at San Antonio, March 25, 1880, and April 9, 1889; and at Gainesville, March 24, 1885, and March 24, 1886.

Fall migration.—The two water-thrushes start south at about the same time, but while *noveboracensis* occupies nearly three months in making its fall migration, the journey of most of *motacilla* is rapid, the latest migrants following closely after the first to leave. Southern New England and southern Minnesota are usually finally abandoned in August. The six years' average of dates of last seen at Renovo, Pa., is September 8, and the latest date September 17, 1894. The fact that no water-thrushes are reported after August from Eubank, Raleigh, or Asheville shows how largely the great body of the birds leave their breeding grounds in the early fall. A belated migrant was seen at Englewood, N. J., October 2, 1885.

South of the United States the birds reached Jalapa, Mexico, in August, 1884; Volcan de Fuego, Guatemala (6,000 feet), in August; Bonacca Island, Honduras, in September, and Jamaica on September 5, 1859.

677. Geothlypis formosa (Wils.). Kentucky Warbler.

Breeding range.—The Kentucky warbler is a forest lover and makes its chief home in the heaviest timbered regions and dark damp woods of the central Mississippi Valley. Eastward it breeds more or less locally from the lower Hudson River Valley to North Carolina. There is a single record of its breeding in South Carolina, and four records of its occurrence during migration in Florida. The Kentucky warbler is common in the State from which it takes its name and in the watershed of the Ohio River and its tributaries. It is uncommon north of this region, but is found as far as Lake Erie, southern Michigan, southern Wisconsin, and southwestern Minnesota. It is accidental in Ontario and Quebec. The western limit of its range is reached in southeastern Nebraska, and thence through eastern Kansas and Indian Territory to eastern Texas. Though not uncommon in favorable localities along the streams in these States, it is not nearly so abundant as in the Ohio Valley. Breeding principally below an elevation of 1,000 feet, it is still not confined to the lowlands. In western North Carolina, in the mountains, it breeds commonly around Asheville at 2,000 feet altitude, and has been noted up to 3,500 feet. The extreme southwestern part of its breeding range is found in the vicinity of San Antonio, Tex. As a migrant the bird has been noted at Corpus Christi, Tex.[a]

Winter range.—The Kentucky warbler is rather common in most of Guatemala, from the hot regions on the Pacific coast to the mountains, and occurs up to at least 7,000 feet altitude. It is known to be a common winter resident of southeastern Nicaragua,[b] and is quite generally distributed over Costa Rica[c] and Panama, both on the coasts and in the uplands to 3,500 feet. The only records of its occurrence south and east of Panama are those of some specimens taken at Bonda,[d] and Santa Marta,[e] Colombia.

Until within recent years our only knowledge of the occurrence of the Kentucky warbler in Mexico was confined to records of its capture at Playa Vicente and Guichicovi. Through the explorations of some of the parties of the Biological Survey, it is now known to be a winter resident of southern Mexico, in the States of Tabasco and Campeche and southward to the Pacific coast.

Spring migration.—The records of occurrence of the Kentucky warbler in spring in Florida are: Tarpon Springs, April 6, 1886; near mouth of the Suwanee River, April 21, 1892; Dry Tortugas, March 29, 1890, and Sombrero Key (where a bird struck the light), April 25,

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[a] Chapman, Bull. Am. Mus. Nat. Hist., III, p. 318, 1891.

[b] Richmond, Proc. U. S. Nat. Mus., XVI, p. 484, 1893.

[c] Underwood, Ibis, p. 434, 1896. Cherrie, Auk, IX, p. 21, 1892.

[d] Allen, Bul. Am. Mus. Nat. Hist. XIII, 177, 1900; Auk, XVII, 366, 1900.

[e] Bangs, Proc. Biol. Soc. Wash., XII, p. 144, 1898.

1887. The earliest migrant of the year was seen at Savannah, Ga., April 8, 1894; near Atlanta, Ga., April 9, 1893, April 8, 1894, April 6, 1895, April 1, 1896, April 8, 1898, and April 10, 1900—average, April 7; at Rising Fawn, in the northwestern corner of Georgia, April 16, 1885, and in the mountains near Asheville, N. C., April 24, 1892, April 22, 1893, and April 18, 1894. The seven years' average of quite irregular records of earliest arrival at Raleigh, N. C., is May 1. More regular dates indicate first arrival at Beaver, Pa., May 1; Berwyn, Pa., May 7; Brookville, Ind., May 6, and Keokuk, Iowa, May 7. The Alabama records are: Greensboro, April 5, 1888; Coosada, April 9, 1878; and Shelby, April 18, 1898. The records for New Orleans are April 2, 1881, April 1, 1894, March 30, 1895, and March 31, 1899. Texas dates are considerably later than those along the Mississippi. From the vicinity of San Antonio, Tex., there are records for five years, varying from April 8, 1890, to April 18, 1901—average, April 14. A date almost identical—April 15—is the average of seven years' records from the extreme northern part of Texas. This is only one of several cases in which the records of spring arrival for northern Texas are fully as early as for the southern part of the State. Taken in connection with the early dates of arrival on the Louisiana coast, these dates seem to indicate that the individuals breeding along the rivers of northern Texas reach their breeding grounds in a northwesterly direction from the northern part of the Texas coast.

The following table gives a good idea of the usual time of arrival of the Kentucky warbler in the central Mississippi Valley:

Spring arrival of the Kentucky warbler.

Year.	Helena, Ark.	Eubank, Ky.	St. Louis, Mo.	Onaga, Kans.
1884	....	....	Apr. 28	....
1885	....	....	Apr. 21	....
1886	....	Apr. 15	Apr. 21	....
1887	....	Apr. 20	Apr. 27	....
1888	....	....	....	....
1889	....	Apr. 19	....	....
1890	....	Apr. 24	....	....
1891	....	Apr. 18	....	....
1892	....	Apr. 22	....	May 13
1893	....	Apr. 15	....	May 14
1894	Apr. 27	Apr. 27	....	May 5
1895	Apr. 21	Apr. 27	....	May 3
1896	Apr. 15	....	....	Apr. 26
1897	Apr. 16	....	....	May 6
1898	Apr. 17	....	....	May 8
1899	Apr. 24	....	....	....
1900	Apr. 19	....	....	Apr. 29
1901	Apr. 21	....	....	May 5
Average	Apr. 20	Apr. 21	Apr. 24	May 5

Fall migration.—Fall records of migration of the Kentucky warbler are not numerous. The southward movement begins the last of July, and by the first of September most of the birds have left their breeding grounds. The date of passage of the last-observed migrant of the year at Berwyn, Pa., is September 4, 1896, and at Raleigh, N. C., September 12, 1894. The latest dates at Eubank, Ky., are September 2, 1887, and September 6, 1888, and the latest at Bonham, Tex., August 20, 1885. The species usually leaves New Orleans by the middle of September, though a very late migrant was noted October 19, 1895.

South of Mexico there are no records of fall migrants except October 7, 1890, San José, Costa Rica, and October 7 and 8, 1897, and October 11–November 12, 1898, Bonda, Colombia.

Later explorations fill the gaps left by previous records and make clear the principal path of migration. The birds from the Mississippi Valley pass south to the Gulf Coast. Since the species is rare on the South Atlantic coast and in the peninsula of Florida, and has probably never been taken in the West Indies, except once at Santiago, Cuba (Gundlach's records for Cuba[a] are probably incorrect), it seems evident that the summer birds of the Atlantic slope follow the general trend of the country to the southwest, and on arrival at the Gulf fly south to the damp region of southern Mexico and Central America. The species seems to avoid the Rio Grande region of Texas and, so far as the records go, all of northern Mexico and Yucatan; and it has not yet been taken in Honduras, though it may occur in the southern part of that country. Its main migration route is determined by the presence of damp, heavy forests.

678. **Geothlypis agilis** (Wils.). Connecticut Warbler.

Breeding range.—Summer records of the Connecticut warbler are rare. There is a single record of its breeding in Manitoba;[b] it was found located for the summer in a tamarack swamp near Hickory, Aitkin County, Minn.,[c] where it was seen from June 21 onward; it was seen in July on the St. Louis River in eastern Minnesota, and therefore probably breeds in that locality; and it is claimed to breed not uncommonly in southern Wisconsin.

Winter range.—There are five records of the occurrence of the Connecticut warbler south of the United States: Tonantins, Brazil,[d] April 9, 1884; Cay Sal, Bahama Islands,[e] May, 1891; New Providence, Bahamas,[f] October 12–14, 1898; Cay Lobos light, Bahamas,[g] May 9, 1901, and Bonda, Colombia,[h] October 22, 1898. Thus, although it is certain that the species winters in South America, there is as yet not a single winter record.

Spring migration.—All writers agree that during the spring migration this species is more common west of the Alleghenies than east, and that the reverse is true in the fall. In spring migration it is found west of the Mississippi River at St. Louis and to the Red River of Minnesota. It is not known from Nebraska, Kansas, or Louisiana, but there is one record of its accidental occurrence in Colorado. It would seem that the principal line of spring migration is from South America to the Bahamas and undoubtedly to Cuba, though the species is not yet reported from that island.

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[a] Gundlach, J. f. Orn., p. 417, 1872.

[b] Seton, Auk, I, p. 192, 1884.

[c] Gault, Auk, XIV, p. 222, 1897.

[d] Berlepsch, J. f. Orn., p. 98, 1889.

[e] Cory, Auk, VIII, p. 352, 1891.

[f] Bonhote, Ibis, p. 510, 1899.

[g] Bonhote, Auk, XX, p. 172, 1903.

[h] Allen, Bull. Am. Mus. Nat. Hist., XIII, p. 177, 1900; Auk, XVII, 366, 1900.

The full record of the Connecticut warbler at the Sombrero Key lighthouse in southern Florida is:

Record of Connecticut warbler at Sombrero Key lighthouse.

Date.	Number of birds striking.	Number of birds killed.	Time of day.	Weather conditions.
Oct. 9, 1885	4	1	8 p. m.-2 a. m	NE.-E., storm and rain.
May 19, 1887 ...	6	1	10 p. m.-5 a. m ...	Moderate east wind and heavy rain.
May 4, 1888	1	1	1-2 a. m	Fresh ESE. wind, cloudy.
May 8, 1888	1	1	12-2 a. m	Fresh SE. wind with much rain.
May 12, 1888 ...	2	1	10 p. m.-3 a. m ...	Calm and clear.

In 1893 the first spring migrants of this species were seen on the lower Suwanee River[a] May 10 and 11, and at South Anclote Key[b] May 24, 1887. The next record to the north is in Chester County, S. C., May 10, 1889. The bird was seen at St. Louis May 14, 1883; May 21, 1884, and May 15 and 22, 1885. Records are more common in Indiana and Illinois, and are usually made about the middle of May, the earliest date being May 4, 1891, at English Lake, Ind. The species has been taken many times in spring in Michigan and Wisconsin, and it can hardly be called uncommon in Minnesota from the Red River on the west to the St. Louis River on the east.

Fall migration.—The Connecticut warbler is not known in Canada east of Ontario, nor in New England north of Massachusetts, except for a few specimens taken at Pittsford, Vt., September 20, 1888;[c] Shelburne, N. H., September 14, and Saco, Me., September 8–15. From its breeding grounds in Manitoba and Ontario it seems to pass south and southeast to the region of the Great Lakes and to the Atlantic in Massachusetts. It has been taken at Chicago and in southern Michigan August 30; Ossining, N. Y., August 26, and at Washington, D. C., August 28. Most of the records of its occurrence in the eastern United States are made in September. Considering the small numbers observed, it strikes the lighthouses with much frequency. It has been reported as striking at Spectacle Reef lighthouse near the Straits of Mackinac. It struck one of the exposition buildings at Milwaukee[d] September 22–23, 1888. Sixteen were killed on the night of September 30, 1883, at Fire Island light,[e] and three at Shinnecock light, both on the south coast of Long Island, and eighteen were killed on the night of October 12, 1883, at Fire Island light. These records show what numbers of the bird must pass in the fall through New England.

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[a] Wayne, Auk, X, p. 338, 1893.

[b] Scott, Auk, V, p. 187, 1888.

[c] Hitchcock, Auk, VI, p. 193, 1889.

[d] Kumlein, Auk, V, p. 326, 1888.

[e] Dutcher, Auk, I, p. 179, 1884.

The Connecticut warbler has been seen at Chicago as late as September 17, 1894; Portland, Conn., October 1, 1894; Englewood, N. J., October 11, 1885; Washington, October 12, 1890; Raleigh, N. C., October 14, 1884, October 15 and 24, 1896, October 13, 1898; Sombrero Key, Fla., October 9, 1885; New Providence Island, Bahamas, October 12, 1898 (when several that remained only four or five days were noted), and Bonda, Colombia, October 22, 1898.

679. **Geothlypis philadelphia** (Wils.). Mourning Warbler.

Breeding range.—The mourning warbler is most common in summer in northern Minnesota and the valley of the Red River of the North in North Dakota and Manitoba. It occurs rarely in eastern Assiniboia. It is found breeding, but is less common in Michigan, central Ontario, northern New York, Vermont, and New Hampshire, and in the Catskills and the mountains of Berkshire County, Mass.; also in Maine, where it seems to be quite common locally in the north eastern part, and east to New Brunswick, Prince Edward Island, and Nova Scotia. It also breeds in some of the mountains of Pennsylvania and West Virginia.

Migration range.—With the exception of a probably accidental occurrence in South Carolina, it has not been recorded outside the mountains at any time of the year in the Atlantic and Gulf States, from North Carolina to Mississippi. It is a rare migrant in Louisiana, but is fairly common in migration in Texas. Its distribution in the United States is therefore fan-shaped. Touching the Gulf of Mexico along the coast of Louisiana and Texas, a distance of 600 miles, the lines of migration extend north to Manitoba and northeast along the west side of the Alleghenies to New Brunswick, Nova Scotia, and the Magdalen Islands. The east and west extension of the breeding ground is nearly 2,000 miles.

Winter range.—The distribution of the mourning warbler in winter is rather less extended than in summer. A single specimen taken on the southeast coast of Nicaragua,[a] February 4, 1892, constitutes the only record for this country. The bird is a not uncommon winter resident in Costa Rica, Panama, and Colombia, and there are a few records of its occurrence in Ecuador. Since the summer home of the species is principally in the Canadian zone, with but few individuals nesting in the Alleghenian, one would naturally expect it to seek the mountains in winter; and it is interesting to note that all the winter records were made at the higher altitudes. In Costa Rica[a] it was taken at San José (3,500 feet), and in Colombia at Sta. Elena[b] (above 6,000 feet), Medellin[b] (5,000 feet), Ocana[c] (3,700 feet), La Concepcion[d] (3,000 feet), and Chirua[d] (7,000 feet). Four males and one female were taken in January in Mapoto,[e] central Ecuador, on the east slope of the Andes, at 7,000 feet. One specimen was taken at Papallacta[f] (11,500 feet), southeast of Quito.

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[a] Richmond, Proc. U. S. Nat. Mus., XVI, p. 484, 1893.

Spring migration.—The records all point to Texas as the region where the species enters the United States and from which it departs. Dresser says: "Early in May I shot five in the long weeds growing in the Medina River bottom. They were abundant, but shy and difficult to get near." Sennett saw "several to many" on the lower Rio Grande; Nehrling considers the species a rather rare migrant near Houston; Merrill and Butcher took specimens in September on the lower Rio Grande, and Lloyd calls the bird a tolerably common fall migrant in southern Texas.

It seems probable that the line of migration of the species is from the highlands of Costa Rica northwestward along the mountains of Honduras and Guatemala and then across the Gulf of Campeche to northern Mexico and eastern Texas. Although along this whole distance from Costa Rica to the Rio Grande but one occurrence has been recorded, that of a specimen taken in the spring of 1901 in Vera Cruz, Mexico, by Colburn, it is to be remembered that practically no collecting has been done during the spring and fall migrations in the higher sections along this route. It is not to be supposed that the birds cover this long distance at a single flight. Cherrie says that the bulk leave San José, Costa Rica, by the 1st of April, and he notes that the last seen in spring passed on April 24, 1889, and April 27, 1890. But the earliest date of arrival in Texas is April 24, 1890, at San Antonio. This leaves nearly a month unaccounted for between Costa Rica and Texas. It is probable that the species actually does occur in the mountains between Texas and Costa Rica, but that up to the present time it has been overlooked.

The mourning warbler is one of the latest migrants to reach the United States. It lingers long in its winter home, specimens having been taken in Colombia, South America, as late as March 25, 1899; in Panama, March 17 and April 7, 1901, and, as already noted, in Costa Rica, April 27. The complete records of observation in Texas are:

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[a] Cherrie, Auk, VII, p. 336, 1890; IX, p. 22, 1892.

[b] Sclater and Salvin, P. Z. S., p. 494, 1879.

[c] Wyatt, Ibis, p. 322, 1871.

[d] Bangs, Proc. Biol. Soc. Wash., XIII, p. 105, 1899; Allen, Bul. Am. Mus. Nat. Hist. XIII, 176, 1900; Auk, XVII, 366, 1900.

[e] Taczanowski and Berlepsch, P. Z. S., p. 74, 1885.

[f] Goodfellow, Ibis, p. 314, 1901.

Lower Rio Grande, May 9–13, 1878; Victoria County, May 3–4, 1887; San Antonio, April 28, 1885, April 24, 1890, May 15, 1890, May 12–13, 1891; Houston, May 16, 1882; Austin, May 19, 1890; Dallas, May 3–18, 1898, May 3–7, 1899; Bonham, May 14, 1885; Gainesville, May 22, 1885, May 6–13, 1889. Farther north the records are: Emporia, Kans., May 15, 1885; western Missouri, May 12–18, 1874; St. Louis, May 19, 1882, May 16, 1883, May 21, 1884, May 13–22, 1885, May 10, 1886, May 14, 1887; Rising Fawn, Ga., May 14–20, 1885; Washington, May 15–30; eastern Pennsylvania, May 6–25; Scarboro, N. Y., May 9, 1897; St. Johnsbury, Vt., May 20, 1900; St. John, New Brunswick, May 24, 1891, and North River, Prince Edward Island, June 10, 1888. Southern Michigan is reached May 17; Listowel, Ontario, May 17; the Parry Sound District, Ontario, May 22, and Ottawa, May 24. An early arrival was noted at Brookville, Ind., May 7, 1881. The first appear on the average at Chicago May 18, and on the same date at Lanesboro, Minn. An individual was seen May 18, 1885, at White Earth, Minn., and another May 23, 1900, at Aweme, Manitoba. Thus, generally speaking, a little less than four weeks is occupied in the journey from Texas to Minnesota, which gives an average daily travel of 45 miles. This high rate of speed is particularly to be noted, both because the species is a late migrant and because the birds are passing over a section of country in which none of them breed. The same rate of speed in the South would just about fill the time between the Costa Rican and Texan dates of arrival.

The records show a comparatively short time spent in any one place during migration. The dates of recorded arrivals in Texas do not extend over quite a month, from the earliest at San Antonio, April 24, 1890, to the latest at Gainesville, May 22, 1885; and the records for any one year do not cover more than three weeks. The great bulk of the birds occupy scarcely two weeks in passing a given place in the central Mississippi Valley.

Fall migration.—Notes on fall migration are almost lacking. The last mourning warbler was noted at Ottawa August 28, 1896; North River, Prince Edward Island, September 3, 1890; Renovo, Pa., September 26, 1899; Cambridge, Mass., September 30, and Ossining, N. Y., October 1. Lloyd reports that mourning warblers had left central Texas by the 1st of September, at which time Cherrie records their arrival in Costa Rica, where he says they are not uncommon by the middle of the month. A belated bird was seen at New Orleans October 7, 1896.

680. **Geothlypis tolmiei** (Towns.). Macgillivray Warbler.

The Macgillivray warbler is one of the common and characteristic species of the western United States, and one of the few of that region that proceed as far southeast as South America. It breeds from New Mexico and Arizona to British Columbia, and occurs east regularly to the foothills of the Rockies, and occasionally many miles out on the plains. In the mountains it breeds to 9,000 feet. It winters from Lower California to Colombia,[a] South America, and is most common along the main range of the mountains.

Spring migration.—The earliest migrants of the Macgillivray warbler seen in the Huachuca Mountains, Arizona, were recorded April 11, 1902. In southern California a few have been seen as early as the last of March, but the general time of arrival in the southern part of the State is the first ten days of April. Farther advance northward is remarkably slow. The average date of arrival in northern Colorado is May 13; at Cheyenne, Wyo., May 14, and at Great Falls, Mont., May 28. Some records of the first noted are: Fort Klamath, Oreg., May 11, 1887; Beaverton, Oreg., May 18, 1885; Columbia Falls, Mont., May 19, 1885; Chelan, Wash., May 21, 1896; Burrard Inlet, British Columbia, June 2, 1885, and Chilliwack, British Columbia, June 8, 1888.

681. **Geothlypis trichas** (Linn.). Maryland Yellow-throat.

Breeding range.—There are three forms of the Maryland yellow-throat on the Atlantic coast, of which *trichas* is the intermediate, breeding from Georgia to Maryland and less commonly to Delaware, southern Pennsylvania, and southern New Jersey. The range northward is occupied by *brachidactyla*, and southward in Florida and along the Gulf coast by *ignota*. In the southern part of its range *trichas* is the form found on the higher lands to the base of the mountains, while the coastal plain and the swamps are occupied by *ignota*.

Winter range.—The typical form *trichas* passes in winter but little south of its breeding range, occupying at this season the Carolinas, Georgia, Florida, and the northern Bahamas. Occasionally one is seen in winter much farther north along the coast. The migrations of this form are so slight that it is not possible to separate the records of its occurrence from those of *brachidactyla*.

681b. **Geothlypis trichas ignota** Chapm. Florida Yellow-throat.

The Florida yellow-throat is an inhabitant of the Austroriparian life zone. It breeds abundantly in Florida and southern Georgia, whence it ranges in a narrow belt along the seaward edge of the coastal plain north to the Dismal Swamp of Virginia, and west to Louisiana. It is largely resident in the Gulf States, its migrations being principally restricted to a slight southward retiring of the more northern birds of the Atlantic coast, and the crossing of some of the Florida birds to Cuba. In neither of these movements can the records be separated from those of the more northern *trichas*. The subspecies breeds throughout most of its range in the Austroriparian zone, but probably not in the tropical region of Florida.

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[a] Sharpe, Cat. Birds Brit. Mus., X, p. 364, 1885.

681d. Geothlypis trichas brachidactyla (Swains.). Northern Yellow-throat.

Breeding range.—The breeding range of the northern yellow-throat occupies the whole of the Mississippi Valley from eastern Texas and eastern North Dakota to the Allegheny Mountains, and from the region above the Gulf strip to Minnesota, northern Ontario, Edmonton, Alberta, and Chippewyan, Athabasca. The known range of this form to the north was extended to the last two points by parties of the Biological Survey, which found the species in 1901 at Edmonton and in 1903 at Chippewyan. East of the Alleghenies the bird breeds from New York and northern New Jersey to southern Labrador and Newfoundland.

Winter range.—In winter the northern yellow-throat is found in the Bahamas, Cuba, and Jamaica; from Louisiana through eastern Texas; from the plateau region of Tamaulipas, Guanajuato, and Jalisco to Oaxaca and Chiapas, and from Yucatan to Guatemala, Nicaragua, and Costa Rica. It is common in the lower districts of Nicaragua.[a] This country marks its normal southern extension, however, for it is so rare in Costa Rica that Cherrie[b] saw but five individuals in three years' collecting, and apparently there are only a few other occurrences recorded.[c] A single specimen was taken at Chiriqui, Panama.[d]

Spring migration.—It is impossible to separate the notes on the migration of the three forms of the Maryland yellow-throat occurring on the Atlantic coast. The notes on which the following statements are based probably relate to all three forms. It is likely that the earliest spring migrants seen at the Florida lighthouses are *ignota*, and that the earliest in North Carolina are *trichas;* also that notes of Maryland yellow-throats in migration north of Maryland apply principally to *brachidactyla*. The lighthouse records of southern Florida include both *ignota* and *brachidactyla*. The earliest dates of striking at Sombrero Key light are March 6, 10, and 11, 1888, and March 3, 11, and 24, 1889. The flight of March 3, 1889, was one of the largest spring flights of Maryland yellow-throats ever noted at Sombrero Key. It lasted nearly all night, and during its continuance about 150 birds struck the light. On the same night Maryland yellow-throats also struck the lighthouse at Fowey Rocks on the coast of Florida 95 miles northeast of Sombrero Key, which is just south of Cape Sable. This is one of the remarkably few instances where a species struck the two lighthouses on the same night. Judging by the lighthouse records, the period of spring migration of the Maryland yellow-throat is one of the most extended. As already noted, the species is a common migrant in March; it is equally common in April, and is one of the few warblers that are common migrants in May in southern Florida. In 1888 it struck the lights at various dates from March 6 to May 20, and the next year from March 3 to May 29—the extreme dates for all years and for the Florida lighthouses. The latest of these dates is later than the time when full complements of eggs of the Maryland yellow-throat are laid in nests a thousand miles to the north. The late flights are not merely the passing of accidental laggards. The largest flight noted in spring was on May 8, 1888, when 175 birds struck Sombrero Key light and 37 dead ones were counted. On May 20, 1888, 18 birds struck, and on May 29, 1889, five were noted. These records give an idea of the great numbers of Maryland yellow-throats that cross between Florida and Cuba.

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[a] Richmond, Proc. U. S. Nat. Mus., XVI, p. 485, 1893; Nutting, ibid., VI, p. 382, 1883.

[b] Cherrie, Auk, IX, p. 21, 1892.

[c] Frantzius, J. f. Orn., p. 293, 1869; Boucard, P. Z. S., p. 52, 1878.

[d] Salvin & Godman, Biol. Cent. Amer., I, p. 150, 1881.

The dates of earliest spring arrival of Maryland yellow-throats at Raleigh, N. C., show the following remarkably even record: March 28, 1887, March 28, 1888, April 1, 1889, March 28, 1890, April 1, 1891, April 2, 1892, March 27, 1893, March 30, 1899—average March 30. Continuing north on the Atlantic slope records of average date of arrival are: Washington, April 22; Philadelphia, April 29; Englewood, N. J., May 4; southeastern New York and central Connecticut, May 5; Boston, May 7; St. Johnsbury, Vt., and southern New Hampshire, May 11; southern Maine, May 14; Quebec, May 17; St. John, New Brunswick, May 18; central Nova Scotia, May 25; southern Ontario, May 8; Ottawa, May 17.

The following table contains records of first arrivals that presumably relate to *brachidactyla*. It shows the general dates of movement in the Mississippi Valley, and also how much later the birds migrate on the plains:

Record of first arrival of northern yellow-throat.

Year.	Rodney, Miss.	Helena, Ark.	Asheville, N. C.	Eubank, Ky.	St. Louis, Mo.	Onaga, Kans.
1883					Apr. 17	
1884					Apr. 18	
1885					Apr. 20	
1886					Apr. 21	
1887	Mar. 30			Apr. 18	Apr. 14	
1888	Mar. 29				Apr. 17	
1889				Apr. 13		
1890	Mar. 25		Apr. 20	Apr. 14		
1891			Apr. 16	Apr. 15		
1892			Apr. 18	Apr. 10		
1893			Apr. 13	Apr. 22		
1894		Apr. 16	Apr. 18			Apr. 29
1895		Apr. 19				May 1
1896		Apr. 14				Apr. 23
1897						Do.
1898		Apr. 9				Apr. 27
1899		Apr. 16				
1900		Apr. 17				Apr. 28
1901		Apr. 14				May 2
Average	Mar. 28	Apr. 15	Apr. 17	Apr. 15	Apr. 18	Apr. 28

The first Maryland yellow-throats are seen on the average at Waterloo, Ind., April 25; in northern Ohio, April 30; in southern Michigan and at Chicago, May 4; Keokuk, Iowa, April 27; Grinnell, Iowa, April 30; Lanesboro, Minn., May 5; Elk River, Minn., May 12; and Aweme, Manitoba, May 22.

As might be expected from the fact that a few Maryland yellow-throats winter in Texas, the dates on which the first are seen in spring in that State are very irregular. In some cases the records of occurrence given below relate to wintering birds. The dates bring out the fact, however, that the bulk of the species moves at a little later date here than nearer the Mississippi River. The records are as follows: Lower Rio Grande, April 11, 1878; Corpus Christi, March 26–April 15, 1899; Refugio County, April 15, 1899; San Antonio, February 22 (common March 5), 1890, February 12 (common April 10), 1891; Austin, March 11 (common March 24), 1890; Fredericksburg, April 21, 1893; Dallas, April 1, 1898, April 2, 1899; Bonham, April 19, 1889, April 22, 1890, April 13, 1891; central Texas, April 4, 1885, April 12, 1894; Houston, "arrive about April 15" (Nehrling); Stillwell, Ind. T., April 7 and 10, 1897.

Fall migration.—The migration range of the Maryland yellow-throat is so filled with breeding birds that it is not possible to define with exactness the beginning of the southward movement in fall. The earliest dates of striking at the Florida lighthouses (when, of course, the birds are unquestionably migrating) are September 14, 1884, September 12, 1885, and September 18, 1887, at Sombrero Key. These records confirm Gundlach's statement that the species reaches Cuba in September. The earliest arrival noted in Jamaica was on October 8, and the earliest in eastern Nicaragua on October 28. The period of fall migration of the species is almost as extended as that of spring. The bulk of the birds leave their northern breeding grounds in September, but even far north some linger until late in the season. The last were seen at Lanesboro, Minn., October 5, 1885; Ottawa, September 27, 1889; North River, Prince Edward Island, September 11, 1887; St. John, New Brunswick, October 3, 1891; in southeastern New York, October 14, 1887; Englewood, N. J., October 18, 1885; Washington, October 20, 1890. In southern Maine and along the New England coast the last are seen October 1–14. At Raleigh, N. C., the dates of the latest fall migrants are October 11, 1886, October 9, 1889, October 11, 1890, and October 14, 1891; and at Asheville, N. C., October 26, 1891, and October 9, 1894. Only once in six years at Eubank, Ky., were any migrants seen after the 1st of October. At Sombrero Key light there were great flights on October 13, 1885, October 16–17, 1887, September 25 and October 2, 4, 8, 9, 11, 29, and 30, 1888. The heaviest flight noted in fall occurred on November 4, 1888. The latest flights were noted on November 10 and 11, 1888, and November 7, 1891. In all there are records of over 2,000 Maryland yellow-throats that have struck Sombrero Key lighthouse. The only species that has struck in larger numbers during the six years in which records have been kept is the black-throated blue warbler.

At St. Louis, after September 20, the numbers of the Maryland yellow-throats grow rapidly less, until at the end of the month only a few loiterers remain. These finally disappeared for the year on October 1, 1896, October 2, 1887, and October 4, 1895. Final departure occurred at Onaga, Kans., September 27, 1891, September 25, 1892, September 30, 1893, September 30, 1894, September 23, 1895, and September 27, 1898.

681a. Geothlypis trichas occidentalis Brewst. Western Yellow-throat.

Breeding range.—From the central portion of the Great Plains to the Pacific slope the western yellow-throat is one of the best-known warblers. It is a bird of the plains and lower foothills, scarcely nesting above 6,000 feet, and breeds from northern Lower California, northern Chihuahua, and western Texas to Washington, Montana, and South Dakota.

Winter range.—In winter the bird is found chiefly in western Mexico, as far south as Tepic.

Spring migration.—The influence of temperature on migration is shown strikingly in the case of the western yellow-throats. The birds arrive at just about the same time—second week in May—on the plains of north-central Colorado and at Great Falls and Columbia Falls, Mont., the latter place almost 600 miles farther north, but enjoying at this period of the year an equal degree of warmth with the Colorado plains. But almost a month earlier than this, southern British Columbia is reached by the Pacific yellow-throats that wintered in the warm valleys of California lying as far north as the plains of north-central Colorado which during the winter season can support no warbler life.

681c. Geothlypis trichas arizela Oberh. Pacific Yellow-throat.

This form inhabits the Pacific coast region, and breeds from British Columbia to Lower California. It winters from Tepic and Mazatlan in western Mexico, north to California.

681e. Geothlypis trichas sinuosa Grinnell. Salt Marsh Yellow-throat.

Occurs in the salt marshes about San Francisco Bay, where it is a permanent resident.

682. Geothlypis beldingi Ridgw. Belding Yellow-throat.

The Belding yellow-throat is a western species, resident in Lower California.

682.1. Geothlypis poliocephala Baird. Rio Grande Yellow-throat.

This Mexican species occurs near Brownsville, Tex., in the lower Rio Grande Valley.

683. Icteria virens (Linn.). Yellow-breasted Chat.

Breeding range.—The northern and western extensions of the summer range of the yellow-breasted chat closely coincide with the corresponding limits of the Carolinian life zone. The breeding range extends from southern New England through southern New York to southern Michigan, southern Wisconsin, central Iowa, southwestern Minnesota, and southern South Dakota, south through eastern Nebraska and eastern Kansas to eastern Texas, and east to the Atlantic coast, with a few scattering records from New Hampshire, southern Ontario, and other points north of the normal limits of the species. Breeding individuals from Texas show a tendency toward the western subspecies, *longicauda*, but on the coast as far south at least as the mouth of the Rio Grande they are more closely allied to the eastern than to the western form. A few miles west, at Monterey, Nuevo Leon, breeding birds approach more closely the western form. In this whole area of several hundred thousand square miles the species is common in localities suited to its habits, except in the mountains of Pennsylvania and the higher parts of the Alleghenies in Virginia. North Carolina, and Tennessee, i. e., above 3,000 feet.

Winter range.—The range of the chats in winter in Mexico and the dividing line at this season between the eastern and western forms have been quite clearly worked out by the parties of the Biological Survey. The eastern bird comes into eastern Mexico from Texas, and, passing through Tamaulipas, northeast Puebla, and northern Vera Cruz, winters abundantly along the coast and in the lower portions of Tabasco, Campeche, and Yucatan, and less commonly back from the coast to an altitude of 4,000 feet. It ranges south over the lower portions of Chiapas to the Pacific coast, and is found sparingly in eastern Oaxaca and south from Yucatan over Guatemala, chiefly in the lower portions of the country, but occasionally to 6,000 feet. The easternmost locality on the Atlantic side at which its occurrence is recorded is southeastern Nicaragua, where it has been observed to be not uncommon during the winter. In Costa Rica it is recorded as a not uncommon fall and spring migrant at San José, probably wintering in the lower lands along the Pacific coast. There are no records of its occurrence in the West Indies nor in South America.

The eastern form of the chat breeds in a district whose limits include an area of 700,000 square miles and throughout which it is quite thoroughly distributed. The outlines of its known winter range include an area of 200,000 square miles. The total limits of the breeding range of the western form include an area of 1,300,000 square miles, but so much of this is mountain and plateau, where it is known that chats do not occur, that the real breeding area is not over 400,000 square miles. The known winter home of the western form has an outside area of 120,000 square miles.

Spring migration.—The chats are late spring migrants. They have not been noted in March anywhere in the United States, except extreme southern Texas. The earliest spring arrivals noted in the eastern part of the United States were at Frogmore, S. C., and ranged from April 7, 1885, and April 9, 1889, to April 19, 1887, April 25, 1884, April 29, 1888, and May 1, 1886. The average date of arrival at Frogmore is probably about April 12. The average date of arrival of the chat in seven years' time at Kirkwood, Ga., is April 22, with variations from April 16, 1894, to April 26, 1901. At Raleigh, N. C., the average date for ten years is April 23, with extremes of April 18, 1888, and April 27, 1893. This is one of the most uniform of all the records of spring arrival of birds at Raleigh. It indicates not only slight variations in the movements of the birds, but also great care and thoroughness on the part of the observer. A few miles west of Raleigh, but still on the plains, the average date of arrival for four years is April 22. In the mountains at Asheville, at 2,000 feet altitude, the average for five years is April 25, with the slight extremes of April 21, 1891, and April 29, 1894. The average at Variety Mills, Va. (fifteen years), is April 29; Frenchcreek, W. Va., and Washington, May 1; Waynesburg, Pa., April 28; Beaver, Pa., May 2; Philadelphia, May 8; Englewood and New Providence, N. J., and in southeastern New York, May 9; in central Connecticut, May 13; in eastern Massachusetts, May 14. An extensive series of notes comes from the Mississippi Valley. The average date of arrival at St. Louis (for seven years) is April 24; at Brookville, Ind., April 29; Columbus, Ohio, May 3; Ganges, Mich., May 4; Keokuk, Iowa, May 3; Iowa City, Iowa, May 5. South of St. Louis the dates are quite early as compared with the records just given. The average for ten years at Eubank, Ky., is April 23; for four years at Helena, Ark., April 20, and for four years in the vicinity of Vicksburg, Miss., April 18. To agree with the foregoing dates the time of arrival of the chat at New Orleans should be not later than April 16, and several days earlier would be a more likely date. The recorded dates are April 22, 1893, April 20, 1895, April 13, 1899, April 23, 1901, and April 11, 1903. Professor Beyer says of the spring arrival of the chat near New Orleans: "This species never occurs within our precincts before the 15th or 18th of April and is never common until about the end of that month and sometimes not until the 1st or 2d of May." To get the full significance of these dates it is necessary to compare them with the dates of arrival of the chat in Texas and in Kansas—in other words, to compare them with the rate of progress from Mexico northward. For this reason the Texas dates are here given in full: Lower Rio Grande, March 26 (Merrill); species becomes common April 8 (Sennett); Corpus Christi, April 13, 1891, April 11, 1899; Refugio County, April 11, 1899; San Antonio, April 14, 1885, April 22, 1889, April 5, 1890, April 10, 1891; Dallas, April 20, 1898, April 21, 1899; Bonham, April 18, 1885, April 16, 1886, April 16, 1887, April 25, 1890, April 20, 1891; Gainesville, April 17, 1885, April 29, 1886, April 26, 1887. A fair average date at San Antonio is April 10 and at the Red River April 19.

A long series of observations at Onaga, Kans., directly north of Dallas, gives May 4 as the average date of arrival for eleven years. The average time of the journey from San Antonio to Onaga, a distance of 685 miles, is therefore twenty-four days, and the daily rate of speed 29 miles per day. This is quite close to the average speed along the Atlantic coast. Hence the records for the Mississippi River are evidently quite different from those to the east and to the west. They are not explainable in accordance with the commonly accepted ideas of bird migration, and are one set of a series of data that are accumulating that indicate that not all birds that cross the Gulf of Mexico cease their flight upon reaching land.

Fall migration.—Chats do not occur in Florida nor in any of the West India islands, and the numbers that pass through Texas are but a small fraction of those that are found in the eastern part of the United States. Hence the great majority must reach their winter home by a flight across the Gulf of Mexico. In the fall the chat migrates early. It deserts in August the northern limit of its range, and by the 1st of September few individuals are left north of latitude 39°. Some records of the last noted are: Englewood, N. J., August 29, 1885; Renovo, Pa., September 21, 1897; Philadelphia, September 24, 1889; Washington, September 19, 1886; Raleigh, N. C., September 1, 1888; New Orleans, September 12, 1899, and Bonham, Tex., September 20, 1889.

683a. **Icteria virens longicauda** (Lawr.). Long-tailed Chat.

Breeding range.—The long-tailed chat inhabits the western United States from the Great Plains westward, but is found principally in the lower districts, breeding to about 6,500 feet. It breeds from central Jalisco, Guanajuato, and the City of Mexico to North Dakota, southern Montana, and central British Columbia.

Winter range.—The parties of the Biological Survey in Mexico found the western form of the chat on the western coast and the higher central plateaus. They took it in Chihuahua, Durango, Jalisco, Guanajuato, Colima, Michoacan, Morelos, and western Puebla, and in Oaxaca to Cuicatlan on the Atlantic slope and Pochutla on the Pacific side.

There seems to be some question of the extension of the range of *longicauda* farther than Oaxaca. The collections of the National Museum and the Biological Survey furnish only negative evidence in this respect. The specimens taken by six different collectors in Guatemala, in both highlands and lowlands, are distintly of the eastern variety. Sumichrast's specimens from Tehuantepec are eastern, and all those taken at Chicharras on the Pacific slope of Chiapas, where the species is rather common, are unquestionably so. If, then, *longicauda* does occur in Guatemala and Honduras, as has been claimed,[a] it would appear from the above evidence that it can not be the common winter variety of this region.

The Biological Survey parties did not find *longicauda* farther north in winter than Colima and Morelos, but Colonel Grayson reports it common from October to April as far north on the coast as Mazatlan.

The summer and winter habitats of the long-tailed chat approach very closely, if they do not slightly overlap. If it be true that the bird does not winter farther southeast than Oaxaca, then the individuals that breed in central Mexico perform at the most a migration of but 500 miles, while those nesting in British Columbia have a migration route of not less than 2,000 miles in length.

Spring migration.—The long-tailed chat enters southern California about April 18, arrives in the central part of the State about April 22, and during the first week in May appears in Oregon and in northern Colorado.

684. **Wilsonia mitrata** (Gmel.). Hooded Warbler.

Breeding range.—The strongly marked colors of the hooded warbler make the species well known wherever it occurs, and consequently a great many records of its distribution exist. It is a bird of the heavy forest of the Carolinian and Austroriparian faunas, and is very abundant near the mouth of the Mississippi and common up that river to central Illinois. It is a rare breeder west of the Mississippi, but extends its range at least to southeastern Nebraska and eastern Kansas. In Texas it is not uncommon in migration along the coast, and is also found, though sparingly, inland as far as San Antonio and Waco. It is abundant from Illinois to the Atlantic coast and south to Florida; also in western and southeastern New York, some parts of southern Connecticut, and in the mountains of the Carolinas up to 3,000 feet. It is rare in southeastern Wisconsin, central Michigan, southern Ontario, and Massachusetts. In northern Florida it is a common migrant, but rare in the southern part of the State. It has been once recorded from the Bahamas.[b] There are no breeding records from Texas and Florida.

Winter range.—The northern coast of Middle America from Vera Cruz to Panama comprises the principal winter home of the hooded warbler. The center of abundance is from Yucatan and Guatemala to southeastern Nicaragua. In eastern Mexico a hooded warbler was seen at Alta Mira,[a] and another was noted at Tamaulipas November 20, 1894. The parties of the Biological Survey took a specimen at Motzorongo, Vera Cruz, in the spring of 1894 and another at Alta Mira in April, 1898. Long previous to these dates Sallé and Sumichrast recorded the bird from Cordoba and Orizaba, Vera Cruz. The species is not uncommon in winter in Yucatan, and during the spring migration is abundant both there and in Tabasco and Campeche. It occurs in winter over most of Guatemala from sea level to about 5,000 feet. Apparently the only record of its occurrence on the Pacific side of middle America is at Retalhuleu in southwestern Guatemala. It is a not uncommon winter resident of the islands off the east coast of Yucatan. It has been taken in September on the islands of Ruatan and Bonacca[b] off the coast of Honduras, on the mainland at Truxillo,[c] and in central Honduras at Comayagua (3,000 feet). From September to February it is an abundant winter resident along the coast of southeast Nicaragua,[d] and is probably more common in Costa Rica than the single record for that country would indicate. Several specimens have been taken on the Atlantic coast of Panama, but it has not been traced as yet to the mainland of South America. It is thus seen that in winter the hooded warbler is principally a bird of the heavy forests along the coast, with a few individuals penetrating to the forests of the interior nd up to an altitude of nearly 5,000 feet.

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[a] Sharpe, Cat. Birds Brit. Mus., X, p. 376, 1885.

[b] Bonhote, Auk, XX, p. 173, 1903.

Spring migration.—The main migration route of the hooded warbler in spring is from southern Mexico to Louisiana. The species arrives no earlier in Louisiana than in Florida or Texas. The average date of arrival in northern Florida is March 28; at New Orleans, March 25, and in central-eastern Texas, March 22. This is a closer agreement in time of arrival at the three localities than has been found in the case of any other migrant. Some closely agreeing Florida dates in 1885 are: Perdido Light, March 19; Pensacola, March 21, and Palatka, March 23. The extremes of arrival in Florida are March 18, 1887, and April 2, 1884; at New Orleans, March 8, 1896, and March 31, 1901; and in Texas, March 13, 1899, both at Corpus Christi and in Refugio County, and March 31, 1890, at San Antonio.

Following the Florida route northward, the first hooded warblers seen in 1885 were noted on April 5 at Savannah, Ga., and on the same date also at Rising Fawn, diagonally across the State, in the extreme northwestern part. The average date of arrival for eight years at Kirkwood, Ga., is April 10, with extremes of April 6, 1897, and April 15, 1899—the least variation in arrival of any of the species reported from this place. The first hooded warblers to arrive in 1885 at Frogmore, S. C., were seen April 10. At Walke, N. C., on the northeast coast, first arrivals were noted on April 3, 1892, and April 6, 1893. These coast records are comparatively earlier than those from the interior. A surprising fact of the spring migration of the hooded warbler is that there is no difference between the dates of arrival of the bird at Raleigh, N. C., only 300 feet above sea level, and at Asheville in the mountains, at 2,000 feet. With other species, arrival in the mountains is from six to ten days later than on the plains; but in the case of the hooded warbler the average date for the same six years' period at both points falls on the same day, April 19, with extremes of April 10, 1893, and April 23, 1892, at Raleigh, and April 12, 1893, and April 24, 1892, at Asheville. Records of arrival still farther north are: Lynchburg, Va., April 29; Washington, May 2; Englewood, N. J., and southern New York, May 4; Branchport, N. Y., May 13, and Buffalo, N. Y., May 20. A hooded warbler was noted on May 10, 1903, at Bridgeport, Conn.

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[a] Richmond, Proc. U. S. Nat. Mus., XVIII, p. 632, 1896.

[b] Salvin, Ibis, p. 253, 1888.

[c] Ridgway, Proc. U. S. Nat. Mus., X, p. 579, 1888.

[d] Richmond, Proc. U. S. Nat. Mus., XVI, p. 485, 1893.

The migration of the species up the Mississippi River gives less concordant dates. The average date of arrival at New Orleans, March 25, has already been given. The average for five years at Helena, Ark., is April 10, or sixteen days later in an advance of 300 miles. The next 300 miles to St. Louis is made in almost the same time, since the average date for five years at this place is April 24. The dates of arrival are somewhat more uniform at St. Louis than at Helena. At the former place the extremes are April 21, 1886, and April 28, 1887, while at Helena the extremes are April 3, 1898, and April 17, 1901.

There is an excellent set of notes from Eubank, Ky., for the seven years from 1889 to 1895. The average date of arrival is April 14, with extremes of April 8, 1890, and April 20, 1895. Eubank is 150 miles from Asheville, N. C., and nearly northwest, yet the average date at Eubank is five days earlier than at Asheville, which indicates that the birds reach Eubank from the southwest by way of the Mississippi Valley.

Central Indiana is reached about April 29, southern Michigan and southern Wisconsin May 13, and southeastern Iowa May 10. The migration route by way of Texas can not be traced north of the State. The few individuals that pursue this route merge into the general army along the Mississippi River.

Fall migration.—The hooded warbler is the only one of the warblers reported as striking any of the lighthouses of Florida that has not been taken at Sombrero Key. The only lighthouse records of the species for the State are of two birds that struck near St. Augustine. The facts that the hooded warbler is rare on the mainland of southern Florida and has not been taken at the three lighthouses in this part of the State and has been seen but a few times in Cuba and Jamaica, and yet is common in northern Florida and Yucatan, show plainly that the southward route of migration of the bird passes directly from

Florida and not by way of Cuba. Hooded warblers, fresh from their trip across the Gulf, were observed in numbers around Perdido Light, in northwestern Florida, March 22 and 26, 1885, and they were once seen in large numbers at sea, when they still lacked 30 miles of reaching the coast, during their migration from Central America to Louisiana. The species begins in August to migrate south. The earliest recorded date of migration in Chester County, S. C., is August 6. Southbound migrants have been noted at Key West, Fla., August 30, 1887, and August 19, 1889; at Bonacca Island, Honduras, in September; at Truxillo, Honduras, September 26, 1887, and in southeastern Nicaragua, September 24, 1892. The date of arrival in Nicaragua would allow sufficient time for the species to cross at one flight to Yucatan and then proceed leisurely south along the coast.

The bulk of the species leave the northern breeding grounds by the middle of September. The last fall migrants have been noted at Renovo, Pa., September 26, 1900, October 13, 1903; Beaver, Pa., September 25, 1890, October 3, 1891; Englewood, N. J., September 15, 1886; Washington, September 15, 1890; Frenchcreek, W. Va., September 29, 1892; Lynchburg, Va., October 10, 1899; Raleigh, N. C., October 1, 1891; Asheville, N. C., September 20, 1890; Sedan, Ind., October 5, 1893; Brookville, Ind., October 20, 1884; Eubank, Ky., September 29, 1889, and New Orleans, October 19, 1895 and 1897, October 25, 1899. The latest record for the United States is of the probably accidental occurrence of the bird at Germantown, Pa., November 19, 1887. Undoubtedly most of the migrants cross directly to the coast of southern Mexico, and only a scattering few continue down the coast of Texas. Few places along the Gulf coast from Corpus Christi southward are adapted to the needs of the bird until the heavy forests begin again at Alta Mira, Tamaulipas.

685. **Wilsonia pusilla** (Wils.). Wilson Warbler.

Breeding range.—The combined breeding and migration ranges of the eastern and western forms of the Wilson warbler cover the greater part of the North American continent. The eastern subspecies scarcely nests south of the Canadian life zone. It breeds in Nova Scotia, New Brunswick, northern Maine, northern Minnesota, Manitoba, and north to Newfoundland, Labrador, Hudson Bay, and Lake Athabasca. There are records of its breeding in the Alleghenian zone at Ottawa, Ontario,[a] and at Pittsfield, Me.[b]

Winter range.—The principal winter range of the eastern form seems to be the Atlantic slope of the mountains of Central America from Guatemala to Costa Rica, a few individuals wintering as far north as Yucatan. There is no record of the bird in South America, and only one instance of its being noted in the West Indies—an accidental occurrence on the Barbados,[a] April 30, 1873.

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[a] McIlwraith, Birds of Ontario, p. 382, 1894.

[b] Morrell, Osprey, IV, p. 5, 1899.

Spring migration.—The Wilson warbler has never been reported at any point below the hundred-foot contour on the United States coast from the Sabine River to Charleston, S. C. It is practically unknown, even as a migrant, in the entire Austroriparian zone, from the northeastern corner of Louisiana to Virginia. Just above this district it begins to be known, as at Shellmound, Miss., Rising Fawn, Ga., Chester County, S. C., and Raleigh, N. C., but it is rare east of the Alleghenies south of Washington. The principal migration route is along the mountain chain and for the most part on its western slope.

During the period of spring migration a party of the Biological Survey spent several weeks in northern and eastern Yucatan. They saw no Wilson warblers, although they covered the whole time during which the species passes from Costa Rica to the eastern United States, and the country was full of other migrating warblers. Two migration routes are open to the individuals of this species that travel between Costa Rica and the Alleghenies. They can keep on the highlands northwestward to eastern Mexico, and pass thence north to Texas and northeast to the Alleghenies—a route that would be entirely by land, and that would explain in a perfectly satisfactory manner the absence of the species from Yucatan, the coast of Honduras, the whole of the southeastern United States, and the West Indies; or they may travel from Costa Rica through Guatemala to Tabasco, and then across the Gulf of Mexico to the eastern United States. A comparison of the dates of migration will aid in deciding which of these routes is employed. Some records of the species south of the United States are as follows: Frontera, Tabasco, seen occasionally in early March, 1900; near Teapa, Tabasco, several noted early in April (one specimen April 5); Motzorongo, Vera Cruz, March 11; Jalapa (4,400 feet), Vera Cruz, March 30 and 31 and April 5, 1897; Las Vigas (8,000 feet), Vera Cruz, April 24, 1897; Tamaulipas, March 26 to May 10, 1888; Nuevo Leon, March 22, 1902. The following Texas dates of earliest spring arrivals are not numerous, but they are enough for the present purpose: Lower Rio Grande, April 26, 1878; Victoria County, April 30, 1887; San Antonio, April 30, 1889, and April 25, 1890; Austin, May 2, 1890; Dallas, May 3, 1898, and May 3, 1899. This is one of the very few sets of Texas dates representing a direct migration northward from the lower Rio Grande to northern Texas. The dates of earliest arrival to the eastward are: Shellmound, Miss., April 15, 1892; Helena, Ark., April 30, 1897; St. Louis, May 1, 1884, April 29, 1885, and May 2, 1887; Rising Fawn, Ga., May 1, 1885; Asheville, N. C., May 7, 1894; Bloomington, Ind., May 8, 1886. According to these dates the birds of the Allegheny Mountains and eastward do not come north by way of Texas. This fact, coupled with the absence of the species from the Gulf coast, seems to show that the return from the South is made by a flight across the Gulf of Mexico. This trip requires a sustained flight of at least 700 miles, but there seems to be no other assumption to explain the observed facts. Records of average dates of arrival farther north are: Washington, May 9; Englewood, N. J., May 13; Beaver, Pa., May 15; East Hartford, Conn., May 13; eastern Massachusetts and southern New Hampshire, May 17; southern New Brunswick, May 26. In southern New England the species often appears by May 10. A Wilson warbler was taken at Godbout, Quebec, June 3, 1884, and one on the Hamilton River, Quebec, May 31. West of the Alleghenies the first arrivals are noted on the average at Waterloo, Ind., May 15; southern Michigan, May 17; Ottawa, May 20; Chicago, May 14; Lanesboro, Minn., May 8; Elk River, Minn., May 14; Aweme, Manitoba, May 15; and Fort Chippewyan, Athabasca, May 26.

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[a] Salvin, Ibis, p. 334, 1873.

Fall migration.—The Wilson warbler breeds so far north that the earliest returning migrants do not appear before August in the United States. They have been noted at Lanesboro, Minn., August 23, 1887; Grinnell, Iowa, September 3, 1887; Chicago, August 16, 1896; Beaver, Pa., September 7, 1889; Englewood, N. J., August 15, 1886; and Washington, August 28, 1887. Some records of the last seen are: Aweme, Manitoba, September 10, 1901; Lanesboro, Minn., September 27, 1891; Grinnell, Iowa, September 25, 1888; Ottawa, September 29, 1890; Pictou, Nova Scotia, August 24, 1894; St. John, New Brunswick, September 17, 1896; Renovo, Pa., September 30, 1895; Germantown, Pa., October 15, 1889. The time of migration south of the United States can not be traced, because the records of the eastern and the western forms can not be separated.

685a. **Wilsonia pusilla pileolata** (Pall.). Pileolated warbler.

Breeding range.—By this subspecies in the present connection is meant the form that occurs throughout the Rocky Mountains and in the Great Basin. It breeds north into Alaska and as far south as western Texas, and possibly the higher mountains of Arizona and Mexico. It ranges casually to Minnesota and western Missouri. In Colorado it breeds commonly at timber-line, ranging from 12,000 feet down to 6,000 feet.

Winter range.—The abundance of the pileolated warbler in winter in Mexico is attested by the fact that the occurrence of the bird has been noted by the parties of the Biological Survey more often than that of any three other species together. It is common from Nuevo Leon southward, and in the western part of Mexico on the highlands at least to Durango. It is there a mountain lover, common from 4,000 to 9,500 feet and ranging to 12,000 feet on the north slope of

Mount Popocatapetl and 11,000 feet on the mountains of western Guatemala. At the same time it is not uncommon on the coast itself as far north as the city of Vera Cruz and also on the Pacific coast in Chiapas, Colima, etc. The pileolated warbler follows the main chain of the mountains southeast until it is fully as far east as the birds from the eastern United States. Collections of Costa Rican birds contain typical examples of this form; one of the specimens taken by Arcé at the volcano of Chiriqui[a] in Panama, now in the National Museum, is certainly a western bird; and those taken by Brown[b] in Panama during 1901 are also undoubtedly western.

Spring migration.—The first pileolated warblers have been noted in southern Arizona April 12, 1902; at Loveland, Colo., May 11, 1889, and at Great Falls, Mont., May 23, 1892.

Fall migration.—Returning migrants have been seen at Great Falls, Mont., August 17, 1889, and at Cheyenne, Wyo., August 25, 1884. They enter Mexico so early that parties of the Biological Survey met them on August 20, 1894, in Oaxaca, and on September 4, 1893, in the Valley of Mexico. It was probably the western birds that Cherrie noted in Costa Rica as first arriving on October 27, 1889, becoming common by November 20, outnumbering all other warblers during December, and being last noted March 6, 1890. In 1902 Carriker[c] found them until April 12 in Costa Rica.

685b. **Wilsonia pusilla chryseola** Ridgw. Golden Pileolated Warbler.

Breeding range.—This is the Pacific coast form of *pusilla*, and breeds from southern California to British Columbia. Specimens have been taken east to Arizona and Fort Klamath, Oregon.

Winter range.—The winter home is in Mexico, at least as far south as Chihuahua, Sonora, and Cape St. Lucas.

Spring migration.—The birds enter the United States in southern California during the first ten days of March, are passing central California during the last week of the month, and arrive in southern British Columbia in the first week in May.

Fall migration.—Records of the beginnings of fall migration are lacking. A belated bird was noted at Chilliwack, British Columbia, November 17, 1888.

686. **Wilsonia canadensis** (Linn.). Canadian Warbler.

Breeding range.—The name of this warbler indicates its principal breeding range, which extends north to Newfoundland, southern Labrador, Hudson Bay, Cumberland House on the Saskatchewan River, Edmonton, Alberta, and Fort McMurray, Athabasca. South the Canadian warbler breeds to central Minnesota, northeastern Illinois, central Michigan, southern Ontario, central New York, eastern Massachusetts, and northwestern Connecticut, and in the Allegheny Mountains to North Carolina, where it occurs from 3,000 feet nearly to the top of the highest peaks. The species is thus confined principally during the breeding season to the Canadian zone, with scattering occurrences in the Alleghenian.

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[a] Salvin, P. Z. S., p. 183, 1870.

[b] Bangs., Proc. N. E. Zool. Club, III, 61, 1902.

[c] Specimens in Carnegie Museum, Pittsburg, Pa.

Migration range.—The great bulk of the species passes along the Atlantic coast and westward to and including the valley of the Ohio. In the interior the bird is a rare migrant from eastern Texas, eastern Kansas, eastern Nebraska, through the valley of the Red River of the North to Manitoba. Accidental occurrences are reported from central Texas, southern New Mexico, and eastern Colorado.

Winter range.—The winter home of the Canadian warbler lies a long distance from Canada. The species is found in greatest abundance in Peru,[a] especially in the northern portion, and in the neighboring regions of southern Ecuador.[b] In these sections it is found through the winter in flocks, which wander over the country on both the eastern and western slopes of the Andes. The extremes of the normal altitudes attained by the bird are 3,700 and 7,000 feet. Most of the records of its occurrence were made at an elevation of 4,000 to 5,000 feet. One specimen was secured at Quito, Ecuador,[c] at 9,500 feet altitude. The extreme southeastern point at which it has been recorded is in the mountains east of Lima, where Jelski took a male and two females on the eastern slope of the Andes at over 10,000 feet elevation. These individuals were 5,700 miles distant from Labrador by the principal route of migration followed by the species. The Canadian warbler has been taken in northern Ecuador and centra Colombia,[d] although not noted by any of the expeditions to northern Colombia, whence it may be inferred that individuals noted in Costa Rica and Panama, where the bird is not uncommon, pass southeast to Ecuador and Peru. The species has not been recorded from Nicaragua, Honduras, Yucatan, or the West Indies, nor for the last thirty years from Florida. It is not uncommon in Guatemala, and the parties of the Biological Survey took it in Chiapas, Puebla, and Tamaulipas, Mexico. In the fall it is not uncommon through these districts. For the most part it keeps in the mountainous country at 3,000–8,000 feet, but has also been taken in migration at 800 feet in Guatemala and at sea level in Panama. It has been recorded in winter in Guatemala, but most of the birds go much farther south. Even in Costa Rica Cherrie saw none in winter, though they were abundant there in fall migration.

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[a] Taczanowski, P. Z. S., p. 508, 1874; p. 223, 1879; p. 6, 1882. Orn. du Pérou, I, p. 468, 1884. Berlepsch & Stolzmann, P. Z. S., p. 332, 1896.

[b] Sclater, P. Z. S., p. 111, 1854; pp. 64 and 451, 1858. Taczanowski and Berlepsch, P. Z. S., p. 74, 1885. Goodfellow, Ibis, p. 314, 1901. Salvadori and Festa, Boll. Mus. Zool. Torino, XV, No. 351, p. 8, 1899.

[c] Sclater, Ann. & Mag. Nat. Hist., XVI, p. 281, 1855.

[d] Sclater, P. Z. S., p. 143, 1855. Salvin, Cat. Strick. Coll., p. 93, 1882. Lafresnaye, Rev. Zool., p. 292, 1843; p. 79, 1844. Sclater, Cat. Am. Birds, p. 34, 1862. Sharpe, Cat. Birds Brit. Mus., X, p. 434, 1885.

Spring migration.—The Canadian warbler is one of the late migrants. The few records of spring arrival of the species that have been gathered in the southern United States are: Southern Texas, May 2, 1877; Corpus Christi, Tex., May 4, 1900; Victoria County, Tex., April 26, 1887; San Antonio, Tex., May 4, 1884; Shellmound, Miss., April 15, 1892; Hickman, Ky., April 24, 1888; Lexington, Ky., April 29, 1899; St. Louis, May 14, 1883, May 11, 1884, May 11, 1885, May 11, 1886, May 8, 1887, April 28, 1888 (next seen May 5; bulk present from May 11 to May 19; last noted in various years May 19 to May 22); Rising Fawn, Ga., April 26, 1885; Highlands, N. C., April 29, 1886; Asheville, N. C., May 4, 1894. As the Canadian warbler passes north it has been noted on the average at Washington May 9; Beaver, Pa., May 5; Philadelphia, Englewood, N. J., and Lockport, N. Y., May 15; in eastern Massachusetts, May 14; southern New Hampshire, May 18; southern Maine, May 19; and southern New Brunswick, May 28.

Rather incongruous dates are reported from west of the Alleghenies. The average date of arrival for five years near Waterloo, Ind., is May 2, and for nine years at Listowel, Ontario, May 4, while not far distant the date of arrival at Chicago is May 15; Petersburg, Mich., May 13; Parry Sound district, Ontario, May 21, and Ottawa, May 21. The first migrant appears on the average at Lanesboro, Minn., May 19. One was seen at Aweme, Manitoba, May 20, 1899, and one at Edmonton, Alberta, May 29, 1897.

In northern Peru in 1878 a specimen was shot as late in the spring as March 28, and in central Ecuador in April, 1899, both males and females were taken. A belated migrant was taken April 28, 1893, at Chalchicomula, Puebla, Mexico, at 8,200 feet altitude. Since latitude 39° in the United States is finally passed in the last week in May by the Canadian warbler, it follows that the late spring birds of this species must make a rapid migration.

Fall migration.—The statements already made outline the probable migration route in fall of the Canadian warbler. The birds from the northeastern section of the United States appear to follow the general trend of the mountains to the Gulf Coast, being found in the fall apparently not east of Mississippi. Thence they cross the Gulf of Mexico to southern Mexico and Guatemala, reaching the Pacific coast at Tehuantepec. They probably then turn southeast and follow the mountains through Costa Rica and Panama to their principal winter home in Ecuador and Peru.

If there were only the United States records at hand, it would be impossible to get a correct idea of the date of fall migration of the Canadian warbler, chiefly because so little attention is paid in this country to July and August bird movements. Few observers think it worth while to begin making notes on southward movements of birds before September, although for a large proportion of migrants the beginning of the fall journey is several weeks earlier. A few records made of the arrival of the Canadian warbler in fall are: Lanesboro, Minn., August 18, 1889; Grinnell, Iowa, August 20, 1886; Chicago, August 15, 1896; Waterloo, Ind., August 16, 1891; Germantown, Pa., August 3, 1890; Englewood, N. J., August 7, 1886; Washington, July 31, 1887; St. Louis, August 15; Asheville, N. C., September 2, 1891; Leighton, Ala., August 18, 1891, and Bay St. Louis, Miss., September 11, 1899. Fall migration begins so early that by the last of August the birds have appeared in southern Mexico, a month later (September 29) have arrived at San José, Costa Rica,[a] and by November 27 have reached northern Peru. This gives a quite uniform rate of speed of 30 miles per day. Were it possible to suppose that any one individual traverses the entire range of the species, such a bird would either have to increase this speed or else spend the entire year on the road.

The month of September is the time of greatest abundance of the Canadian warbler in Central America. The parties of the Biological Survey noted its disappearance soon after the middle of the month from Chiapas, and nearly all the records from Guatemala were made in September. Hoffman found the species in September on the highlands of Costa Rica, and Cherrie found it most abundant on October 6 at San José, Costa Rica. Records of the last migrants seen are: Fort McMurray, Athabasca, August 10, 1903, and August 12, 1904; Grand Rapids, Athabasca, August 20, 1901; Aweme, Manitoba, August 30, 1901; Ottawa, September 5, 1890; Chicago, September 16, 1894; Waterloo, Ind., September 28, 1902; Petitcodiac, New Brunswick, August 21, 1886; Pittsfield, Me., September 12, 1897; Amherst, Mass., September 29, 1891; Englewood, N. J., October 2, 1886; Renovo, Pa. (average of six years), August 14; Germantown, Pa., October 1, 1889; Washington, September 25; St. Louis, September 22, 1885; Asheville, N. C., October 10, 1891, and October 19, 1894; Ariel, Miss., October 14, 1897, and Bay St. Louis, Miss., October 15, 1899.

687. Setophaga ruticilla (Linn.). Redstart.

Breeding range.—The summer range of the redstart extends over 27° of latitude, from 35° to 62°, and over 69° of longitude, from 54° to 133° in southeastern Alaska (to 123° in the United States). The species breeds north to Nova Scotia, Newfoundland, Hudson Bay, and Fort Good Hope on the Mackenzie River. In the United States it is chiefly eastern, but ranges west regularly to the Great Basin. It breeds in Utah, Idaho, British Columbia, and eastern Washington, and has occurred casually at various seasons in Arizona, Lower California, California, and Oregon. The breeding range extends south to North Carolina, Arkansas, etc. The bird breeds at Fort Union, N. Mex., and probably at Greensboro, Ala., and has been reported during the breeding season at various places south of latitude 35°, but these records are to be considered exceptional. A species that breeds in the Canadian life zone of Newfoundland and also in the southern Alleghenies would be expected to seek the higher portions of these mountains, but the redstart at the southern limit of its range nests in the lower valleys, scarcely rising to 2,000 feet.

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[a] Cherrie, Auk, VII, p. 337, 1890.

Winter range.—The winter distribution of the redstart is also very extensive, covering 25° of latitude, 23° N. to 2° S., and 38° of longitude, 60° to 98°. The species is a common spring and fall migrant in the northern Bahamas, and a few individuals may winter in some of the southern islands. It is an abundant winter resident in the Greater Antilles and has a remarkable extension in the Lesser Antilles. It is recorded from 4 of the Virgin Islands, 8 of the Leeward Islands, including Dominica,[a] and from St. Lucia,[b] St. Vincent,[c] Grenada,[d] Barbados,[e] Tobago,[f] and Trinidad.[g] Toward the east its numbers diminish, so that it is rare in the Windward Islands.

A great many redstarts pass to the mainland of South America, but their distribution appears not to be extensive. On the north coast of Colombia[h] the species is common both in migration and in winter, and penetrates the interior about to the central part of the country,[i] where it is common at 3,000–6,000 feet altitude. It has been recorded from Esmeraldas[j] on the coast; Perucho[k] at 6,300 feet on the west slope of the Andes; Quito[a] and Chimbo[b] in western Ecuador at above 9,000 feet, and at Papallacta[c] (11,500 feet) southeast of Quito on the east slope of the Andes, where it was not uncommon. The latter places, two degrees south of the equator, are the southernmost points at which it has been recorded. It has been taken once at Merida[d] (5,400 feet) and once at Caracas,[e] both in Venezuela; once at El Pilar[f] on the coast of Venezuela; twice in the Orinoco region,[g] and once on Mount Roraima[h] in British Guiana, where its eastern winter range is carried to 60° west longitude.

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[a] Verrill, Trans. Conn. Acad. VIII, p. 343, 1892.

[b] Sclater, P. Z. S., p. 14, 1876.

[c] Lawrence, Proc. U. S. Nat. Mus. I, p. 189, 1878.

[d] Wells, Proc. U. S. Nat. Mus. IX, p. 611, 1887.

[e] Feilden, Ibis, 482, 1889.

[f] Jardine, Ann. & Mag. Nat. Hist. XX, 331, 1847.

[g] Chapman, Bull. Am. Mus. Nat. Hist. VI, p. 24, 1894; Salvin, Cat. Strick. Coll., p. 95, 1882; Sclater, Cat. Am. Birds, 36, 1862; Ernst, Rev. Cient. Univ. Venez. I, p. 33, 1887.

[h] Salvin & Godman, Ibis, p. 199, 1879; ibid., p. 118, 1880. Bangs, Proc. Biol. Soc. Wash., XII, p. 144, 1898. Allen, Bull. Am. Mus. Nat. Hist., XIII, p. 176, 1900; Auk, XVII, p. 366, 1900.

[i] Wyatt, Ibis, p. 323, 1871. Sclater & Salvin, P. Z. S., p. 494, 1879. Berlepsch, J. f. Orn., p. 284, 1884. Sharpe, Cat. Birds Brit. Mus., X, 414, 1885. Sclater, P. Z. S., p. 144, 1855.

[j] Sclater, P. Z. S., p. 292, 1860.

[k] Ibid., p. 84.

To the west a redstart was taken February 24, 1883, at Miraflores,[i] Lower California. This must have been an accidental occurrence, however, for the parties of the Biological Survey have never observed the species in western Mexico, though they found it abundant through the winter in eastern Puebla, southern Vera Cruz, Tabasco, Campeche, and Yucatan. It was not seen by them in Oaxaca, Chiapas, or anywhere on the Pacific slope, though in migration it has been taken at Santa Efigenia, Oaxaca, the City of Mexico, and as far west as the city of San Luis Potosi. All the winter birds were seen below 1,000 feet altitude. In migration, however, a few range to about 7,500 feet. The low winter range may perhaps be due to the fact that the higher lands of Mexico from 1,300 feet up are occupied by several closely related resident species, for in the Rocky Mountains of Colorado the redstart breeds at heights ranging from 5,000 to 8,000 feet.

In Guatemala the American redstart has a wider altitudinal range than in Mexico, and is found throughout the country from the Pacific coast to at least 6,000 feet altitude in the interior. It is one of the few United States warblers that have been recorded in Salvador. It is a common winter resident on the east coast of Nicaragua,[j] and equally common in Costa Rica[k] to at least 1,400 feet. In Panama its range is about the same.

Spring migration.—The records of spring migration of the redstart in Florida are scattering and contradictory. It is therefore necessary to consider the North Carolina records before enough data can be obtained to determine definitely the date of arrival of the species from the South. Statesville and Raleigh, N. C., are in the same latitude and 200 miles apart. Raleigh is about 300 feet above sea level and Statesville 1,000 feet. At both places simultaneous observations were taken in April, 1885, 1887, and 1888, as follows: 1885—Raleigh, first seen 9th, next 13th, common 20th; Statesville, first seen 10th, next 12th, common 20th. 1887—Raleigh, first seen 13th, next 16th, common 18th; Statesville, first seen 10th, next 11th, common 15th. 1888—Raleigh, first seen 2d, next 3d, common 12th; Statesville, first seen 3d, next 4th, common 10th. Average—Raleigh, first seen 8th, next 11th, common 17th; Statesville, first seen 8th, next 9th, common 15th. Average for both places—first seen 8th, next 10th, common 16th. These records seem to determine quite closely the date of arrival of the redstart in North Carolina. Migration in the spring of 1888 was earlier than usual, as April 2 is the earliest date of arrival at Raleigh in fifteen years of observation. The average for these fifteen years is April 10.

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[a] Sclater, P. Z. S., p. 111, 1854; Ann. & Mag. N. H., XVI, 281, 1855.

[b] Berlepsch & Taczanowski, P. Z. S., p. 541, 1883.

[c] Goodfellow, Ibis, p. 315, 1901.

[d] Sclater & Salvin, P. Z. S., p. 780, 1870.

[e] Ernst, Flora and Fauna Venez, p. 301, 1877.

[f] Allen, Bull. Am. Mus. Nat. Hist., IV, p. 51, 1892.

[g] Berlepsch & Hartert, Novit. Zool., IX, 11, 1902.

[h] Salvin, Ibis, p. 203, 1885. Cabanis, Schomb. Reis. Guiana, III, p. 667, 1848. Quelch, Timehri, X, p. 262, 1896.

[i] Belding, Proc. U. S. Nat. Mus., VI, p. 350, 1883.

[j] Richmond, Proc. U. S. Nat. Mus., XVI, p. 485, 1893.

[k] Underwood, Ibis, p. 434, 1896.

The distance from the south end of Florida to central North Carolina is 650 miles. The apparent speed of migration of the redstart, as obtained from the records of its vernal advance in the Mississippi Valley, is 30 miles per day. Hence, if the birds which arrived in North Carolina on the dates above given landed first in Florida and then passed overland at a similar rate of speed, they must have reached the southern end of Florida, on the average, by March 20. It is well to note first that these early migrants in North Carolina do not come by way of the Bahamas. Redstarts do not winter in any of the Bahamas within 400 miles of Florida. Bryant saw none until April 18 on New Providence and Andros islands; Northrop noted none until April 10, 1890, on Andros; Cory noted the first migrant of the season on March 27, 1891, on New Providence Island, and on March 18 of the same year the naturalists of the steamer *Albatross* secured their first specimen on the same island. It is probable from these records that the van of the northward migration in North Carolina is composed of birds that have wintered in Cuba.

Few records of occurrence of the species in spring south of North Carolina accord with the average date of April 10 at Raleigh. Instead of March 20 the earliest dates of redstarts striking the light at Sombrero Key, Fla., are April 14, 1885, April 12, 1887, April 18, 1888, and April 3, 1889, and the earliest at the Tortugas is March 30, 1890. In Chester County, S. C., the earliest date of arrival in fourteen years is April 10. Other early records of arrival south of North Carolina are: Pensacola, Fla., April 5, 1885; Rising Fawn, Ga., April 10, 1885; Gainesville, Fla., April 7, 1887; Tarpon Springs, Fla., April 11, 1895, and month of Suwanee River, Fla., March 22, 1890. With these records are to be considered the dates of arrival at Savannah, Ga., April 19, 1885, and at Darien, Ga., April 28, 1890; and the average for six years near Atlanta, Ga., April 23, with extremes of April 17, 1896, and April 30, 1897.

The dates of arrival of the redstart in the Mississippi Valley show a state of affairs similar to that exhibited by the records made on the Atlantic coast—that the species is rare and late on the southern coast, early and abundant in the interior. A possible explanation is that the redstart is not a swamp dweller, and while a bird of the forest, prefers hard-wood timber, and that in its flight from Cuba, Yucatan, and southern Mexico, therefore, it does not alight as soon as it sights land, but passes on into the interior until it attains the desired feeding grounds.

Along the Atlantic slope the rate of further advance is exemplified by the following records of average date of arrival: Washington, April 23; Beaver, Pa., April 29; Renovo and Germantown, Pa., and Englewood, N. J., May 3; southeastern New York, May 4; northeastern New York, May 11; Portland, Conn., May 6; Providence, R. I., May 9; Boston, May 6; southern New Hampshire, May 12; southern Maine, May 13; Montreal, May 16; Quebec, May 14; St. John, New Brunswick, May 20; central Nova Scotia, May 25; North River, Prince Edward Island, May 27. The average date of arrival of the redstart for several years at Helena, Ark., is April 13, with extremes of April 9, 1898, and April 18, 1900. At Eubank, Ky., the average for seven years is April 16, with extremes of April 12, 1890, and April 21, 1894. At St. Louis the average for six years is April 19, with extremes of April 17, 1883, 1884, and 1888, and April 24, 1887. Helena is about 300 miles north of New Orleans, and on the basis of the usual speed of migration the redstart should reach the latter place about April 1. The species is apparently rather rare in spring at New Orleans, though common in fall. Three observers failed to see it at all in five out of eight years of observation. In each of two other years, 1898 and 1890, a single bird was seen April 8, and in 1894 one was seen on April 7, and several were noted on April 11. Farther north in the Mississippi Valley records of the average date when the first redstart appears are: Columbus, Ohio, April 26; Waterloo, Ind., April 29; Petersburg, Mich., April 30; Locke, Mich., May 7; southern Ontario, May 6; Ottawa, May 17; Chicago, May 8; southern Wisconsin, May 9; Keokuk, Iowa, May 2; Lanesboro, Minn., May 11; Elk River, Minn., May 12; Aweme, Manitoba, May 14.

The recorded dates of arrival of the species in Texas are without any regularity: Corpus Christi, March 26–April 25, 1891, April 15, 1899; Refugio County, April 15, 1899; Bee County, April 10, 1886, April 16, 1887; San Antonio, April 16, 1890, April 16, 1891; and Dallas, April 21, 1898, April 22, 1899. These records show that migration in Texas is later than in Louisiana, just as in the Mississippi Valley it is later than along the South Atlantic coast. A set of extended and excellent notes from Onaga, Kans., for eleven years, 1891–1901, indicates that the average date of arrival of the redstart at this place is May 5. Onaga is in northeastern Kansas, and the date accords well with observations made at four towns in the southeastern part of the State, where the average date of arrival is May 3. Both these dates indicate a decidedly later migration to the westward on the plains. The average date of arrival of the species at corresponding latitudes along the foothills of Colorado is about ten days later than along the Mississippi River, and much the same difference appears in Montana, where the first migrants have been seen at Terry May 16, Great Falls May 21, and Columbia Falls May 24. Hence it is fair to presume that it was not by way of Montana that the redstarts came which appeared at Osler, Saskatchewan, May 17, 1893; Fort Chippewyan, Athabasca, May 23, 1901; Fort Resolution, Mackenzie, May 23, 1860; and Fort Simpson, Mackenzie, May 20, 1860, and May 25, 1904. A redstart was seen on June 8, 1889, at Chilliwack, British Columbia.

The redstart is one of the latest warblers to leave its winter home. It was taken on March 30, 1899, at Valparaiso, Colombia; on March 6, 1889, at San José, Costa Rica, and March 13, 1864, elsewhere in that country, and in May on the island of Cozumel. One was seen in May in Tabasco, Mexico, and another in April in Oaxaca. In 1900, as late as the middle of June, a redstart came aboard a vessel in the Bay of Campeche.

Fall migration.—The redstart is one of the earliest fall migrants to reach Cuba. Whenever birds strike in the early fall at the Florida lighthouses, this species is almost sure to be among them. The redstart breeds over so much of the eastern United States that the beginning of its southward movement is somewhat difficult to note. It is safe to say, however, that migration begins in July and is well under way by the latter part of the month. Consequently the finding of both male and female redstarts in a given locality in the middle of July does not make it safe to assume that they nested there. In Chester County, S. C., just south of the breeding range in the Alleghenies, the earliest southbound migrant of the year was seen on July 10, though of course migrants are not common in July. The earliest dates of the arrival of fall migrants at New Orleans are July 21, 1899, July 29, 1900, and July 30, 1897. At Key West, Fla., where the species certainly does not breed, it was seen July 22, 1889; and near there, at Sombrero Key lighthouse, the earliest dates of striking the light are July 28 and 29, 1886. The regular tide of migration sets in early in August, and the species has struck the Florida lighthouses on nineteen different nights of this month.

The redstart has been taken in Jamaica by August 10; on the Pacific slope of Costa Rica at San José,[a] August 13, 1889; on the north shore of Colombia, September 2, 1898, and on the island of Antigua September 6. All the way from its summer to its winter home, therefore, the redstart is among the earliest migrants.

Migration is early along the western limit of the range of the species, but not so extraordinarily early as in the east. The migrants reach central Texas by the last of August, and have been noted near the southern limit of their range at San Luis Potosi, Mexico, by the 1st of September.

For a bird that winters abundantly in Cuba the redstart closes its migration rather early. It is seldom seen in New England after the last week in September, and the largest flocks pass through North and South Carolina about the middle of the month. Some records of the last seen are: Ottawa, September 29, 1890; Montreal, August 29, 1891; North River, Prince Edward Island, September 7, 1890; St. John, New Brunswick, September 25, 1891; eastern Massachusetts, September 24, 1896; Portland, Conn., September 26, 1890; southeastern New York, September 28, 1890; Englewood, N. J., October 3, 1886; Germantown, Pa., October 8, 1888; Washington, September 24, 1890; Frenchcreek, W. Va., September 30, 1890. The greatest number of the species strike the Florida lighthouses in the first half of October, though the greatest single flights were on September 17 and 18, 1887, when about 150 birds struck each night. The eight years' average date of the last southbound migrant seen at Raleigh, N. C., is October 9, while the latest single date is October 13, 1886 and 1891. The latest recorded date of fall migration at Asheville, N. C., is October 28, 1894; that at Tarpon Springs, Fla., November 1, and those at Sombrero Key lighthouse, October 13, 1885, October 25, 1886, October 17, 1887, and November 4, 1888. The following records of final departure west of the Alleghenies are similar in point of time: Fort McMurray, Athabasca, August 14, 1904; Great Falls, Mont., September 14, 1889; Aweme, Manitoba, September 20, 1900; Lanesboro, Minn., September 22, 1887; Grinnell, Iowa, September 28, 1885; Chicago, October 5, 1894; Waterloo, Ind., October 11, 1889; Eubank, Ky., October 7, 1891; Ariel, Miss., October 18, 1897; and New Orleans, October 27, 1899.

688. **Setophaga picta** Swains. Painted Redstart.

The painted redstart is a common resident species of the mountains of Mexico, Guatemala, and Honduras from 3,000 to 9,000 feet.

It occurs as a summer resident in southern Arizona and southern New Mexico and retreats to Mexico for the winter. It is thus resident over most of its range and is a migrant in the northern portion. The first migrant appeared in southern New Mexico March 26, 1889, and in southern Arizona March 15.

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[a] Cherrie, Auk, VII, p. 337, 1890.

[689.] **Setophaga miniata** Swains. Red-bellied Redstart.

The red-bellied redstart is a well-known resident species of Mexico and Guatemala, where it is found at an elevation of 1,500 to 8,000 feet. It is said by Giraud to have been taken in Texas, though its known range does not reach within several hundred miles of that State.

690. **Cardellina rubrifrons** (Giraud). Red-faced Warbler.

The red-faced warbler breeds in the mountains of northern Mexico, southern Arizona, and New Mexico, and winters high up in the pine forests of Mexico and Guatemala. The arrival of the first was noted April 20 in the Huachuca Mountains, Arizona.

[691.] **Ergaticus ruber** (Swains.). Red Warbler.
[692.] **Basileuterus culicivorus brasheri** (Giraud). Brasher Warbler.
[693.] **Basileuterus belli** (Giraud). Bell Warbler.

These three warblers are all resident species in the pine regions of Mexico and Guatemala. Their only standing in the list of United States birds is the statement of Giraud that he took them in Texas.

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